Ashley A. Peck
Phone (801) 799-5913
AAPeck@hollandhart.com

HOLLAND&HART LLP
THE LAW OUT WEST

November 18, 2016

VIA E-MAIL

Mr. Chris Bellovary
U.S. Environmental Protection Agency
Office of Regional Counsel
1200 Sixth Avenue, Suite 900, ORC-113
Seattle, WA 98101-3140

Re: Final Detailed Plan

Dear Chris:

Enclosed please find the Final Detailed Plan for Highland Flats Tree Farm on behalf of Essential Oil Research Farm, LLC ("Young Living"). The Final Plan incorporates all of the responses to the EPA Request for Additional Information ("RAI") and we have also summarized below any additional changes made since EPA's RAI.

The Final Plan includes changes associated with the HW Restoration area topsoil replacement with a weed-free soil in response to EPA's expressed concern in Comment #5 regarding the risk of reintroducing weeds. Young Living was able to locate a clean topsoil source. Due to the change to removing the weedy topsoil and replacing it with clean topsoil, additional solarization was not necessary on the clean soil. Conversely, Summer 2016 was relatively cool and additional weed control solarization time was warranted for all areas in which the original topsoil would remain intact and no grading would occur.

As a result, a HW Restoration area sequencing change was proposed to Ms. Valette on September 26, 2016 in which the areas to be planted in Fall 2016 would include all graded areas in HW-2 and Upper HW-3a (in lieu of the originally proposed partial planting there), and the solarization material would be kept on for an additional year in HW-3a Upl and HW-3b. This change was accepted by Ms. Valette on September 27, 2016 and the changes are described in Section 4.1 of the Final Plan. The Detailed Plan also provides an updated schedule, which incorporates the actual date of the Section 404 permit issuance at the end of September.

Additional changes to the sequencing and schedule due to the timing of the permit issuance and fall weather conditions will be described in a subsequent construction report. We appreciate your cooperation and professionalism in working with the company to resolve these matters. Please let us know if you have any questions.

Sincerely,

Ashley A. Peck
HOLLAND & HART LLP

AAP/ju/bwt
Enclosures (1)
cc: Yvonne Valette
Leslie Gecy

Holland & Hart LLP
Phone [801] 799-5800 **Fax** [801] 799-5700 **www.hollandhart.com**
222 South Main Street Suite 2200 Salt Lake City, UT 84101
Aspen Boulder Carson City Colorado Springs Denver Denver Tech Center Billings Boise Cheyenne Jackson Hole Las Vegas Reno Salt Lake City Santa Fe Washington, D.C.

HIGHLAND FLATS TREE FARM

WETLAND AND RIPARIAN MITIGATION PLAN

-FINAL DETAILED PLAN-

Prepared for

Essential Oil Research Farm, LLC
Naples, Idaho 83847

Prepared by

EcoWest Consulting, Inc.
Baker, Oregon 97814

October 2016

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

The Highland Flats Tree Farm is located at 5060 McArthur Lake Road in Naples, Boundary County, Idaho (Appendix A, Figure A-1). The approximately 250-acre property (Farm) is owned by Essential Oils Research Farm, LLC (Essential Oils) and is managed for the production of a variety of trees including blue spruce, balsam fir, western red cedar, and pines. The elevation at the Farm headquarters is approximately 2,285 feet above Mean Sea Level.

Between June and July 2013, Essential Oils constructed a reservoir on an unnamed, intermittent stream draining into Fall Creek. The reservoir is located approximately 1,000 feet downstream of the Farm headquarters, with a legal address of T60N R1W S3 SE1/4 SE1/4. The reservoir failed in April 2014, resulting in downstream siltation. The reservoir was re-constructed in September 2014. The EPA (2016) determined that the reservoir construction, subsequent failure, and re-construction affected approximately 0.47 acres of wetland and stream habitat, including a permanent loss of approximately 200 linear feet of aquatic habitat and temporary impacts to approximately 300 linear feet of aquatic habitat.

A conceptual compensatory mitigation plan (Conceptual Plan) was submitted to the EPA on March 1, 2016 (EcoWest 2016). EPA verbally accepted revisions to substitute mitigation around the reservoir for a previously designated area exhibiting upland soils on May 18, 2016. A revised Conceptual Plan with the area substitution was resubmitted on May 26, 2018. The approved Plan is for compensatory mitigation for both wetland and stream habitat as follows:

- Rehabilitation of 1.5 acres of headwater stream riparian habitat, of which a portion will consist of wetland riparian habitat and a portion will consist of upland riparian habitat (HW Restoration area). This mitigation is proposed as compensation at a 3.3:1 ratio for the reservoir footprint in terms of acreage and a 5:1 ratio for the lineal feet of permanent stream impacts.

- Enhancement of 290 lineal feet of the unnamed stream immediately upstream of the culvert through shrub planting (Culvert Enhancement area). This will occur where the riparian bench widens and the canopy opens sufficiently for planted shrub survival.

- Rehabilitation of the mostly bare area along the newly-created reservoir margin (230 lineal feet and 0.09 acres) (Reservoir Mitigation Area).

The primary mitigation area will be the Headwater (HW) Restoration area which meets the minimum mitigation ratio of 3:1 for rehabilitation (Table 1), with the other areas added to provide additional riparian wetland benefits within the impacted area and downstream of it, and to provide supplemental mitigation.

Two reference areas were also identified for the purposes of identifying native species on-site:

- Headwater (HW) Remnant: a 2.4 acre intermixed forested, shrub and herbaceous wetland

west of the HW Restoration area.

- Reservoir Reference: a 2.0 acre area immediately upstream of the constructed reservoir, primarily consisting of a mix of upland riparian and open forested/scrub wetland with a narrow fringe of reed canary grass marsh.

Appendix A, Figures A-2 through A-4 depict the location of the three mitigation and two reference areas.

Table 1. Summary of the Mitigation Types and Proposed Mitigation Acres and Ratios.

Site	**Type Activity**	**Area**		**Mitigation Ratio**	
		Acres	**Lineal Ft Stream**	**Acres**	**Lineal Ft**
Headwater	Rehabilitation	1.54	1,145	NA	NA
Culvert	Enhancement	0.30	290	NA	NA
Reservoir	Mixed	0.09	NA 230 ft shoreline	NA	NA
Overall		**1.93**	**1,435 + 230 ft shoreline**	**4.1:1**	**7.2:1**

The purpose of this document is to provide a Detailed Mitigation Plan for each of the three mitigation areas, supplementing the information provided in the Conceptual Plan and including additional description of site conditions during the growing season, as well as details on grading, weed control, planting and irrigation measures, and a post-construction monitoring plan.

This document is divided into several sections to ensure that all pertinent background site information is presented along with a rationale for individual Detailed Plan specifications. Sections 2.0 and 3.0 provide a description of the data sources and collection methods used to develop the Detailed Plan, as well as a summary of existing site early growing season conditions. Section 4.0 contains the Detailed Mitigation Plan, with the associated Plan maps in Appendix B. Sections 5.0 and 6.0 provide the Monitoring and Contingency Plans as well as the full Project Schedule.

2.0 METHODS

This Detailed Plan is based upon the information presented in the Conceptual Plan (EcoWest 2016), as well as additional data collected during the early growing season, and provides a compilation of all data necessary for restoration or enhancement within the designated areas.

2.1 Existing Data Sources

Existing data sources included:

- US Fish and Wildlife Service (USFWS) National Wetland Inventory Map (NWI)
- USFWS IPaC Resource Report identifying federally listed and sensitive resources in the area
- Google Earth satellite imagery dated 7/11/2014, 7/14/2013, 9/6/2012, 6/23/2009, and 6/15/1992
- NRCS soil data for Boundary County (NRCS 2005), with a site-specific soil map developed using the Web Soil Survey program (NRCS 2016a)
- USGS Naples 7 ½ minute topographic quadrangle
- Precipitation data from National Oceanic and Atmospheric Administration (NOAA), NRCS (2005) data for Boundary County and national PRISM data published by Oregon State University (2016).

An overview of the existing site data is summarized in Section 3.1, with area-specific details provided for each of the mitigation and reference areas in Sections 3.2 through 3.6.

2.2 Field Data Collection

Site visits occurred on February 23 and April 24 to April 30, 2016, with additional examination of potential topsoil donor sites July 26 to July 27, 2016. During the site visits, all restoration and reference areas were examined by a Professional Wetland Scientist. In the February site visit, impacted and proposed restoration areas were field mapped using a hand-held GPS. Boundaries of the proposed mitigation and the HW Remnant areas were subsequently surveyed by a registered land surveyor and topographic maps (1 foot contours) developed for each of these areas. Boundaries of planting zones, representative cross sections, longitudinal stream profiles and the locations of ground water wells were also surveyed. Boundaries of the Reservoir reference area were mapped using a hand-held GPS.

The vegetation community types and dominant plant species were identified in both restoration and reference areas. In all areas, relevés were used to identify dominant plant species in each strata, with nested plots used to characterize the plant community at each designated data point and along representative cross sections. Because of the narrowness of the riparian communities, rectangular plots oriented parallel to the stream were used -- a 5 by 10 feet plot for the herbaceous layer, a 10 by 15 foot plot for the shrub/sapling layer and a 10 by 30 foot plot for the tree stratum. There were no woody vines in the wetlands. Particular attention was paid to the cover and distribution of common tansy and reed canary grass, two non-native invasive species known to occur in the area.

There were 10 data points in each reference area, for a total of 20 vegetation reference points and 20 mitigation area data points, in addition to area relevés. Soil and ground water were examined at a subset of these (21).

Each recorded plant species was characterized according to both wetland indicator and native vs. non-native status. Wetland indicator status was identified according to the 2014 National Plant List (Lichvar et al. 2014), as separated out for the State of Idaho for Western Mountains, Valley and Coast (WMVC, available on the Walla Walla District Army Corps of Engineers [COE] website). The native vs. non-native plant status was identified according to the NRCS PLANTS database (NRCS 2016b).

Soil profiles were examined according to the 1987 COE Delineation Manual, WMVC Supplement protocols along the representative cross sections and compared to the NRCS (2005) soil profile descriptions. Where they matched, an acidic topsoil and alkaline subsoil was assumed and used in selecting plant species. Soil profiles were also carefully compared with reference areas to identify if there were any soil differences that would warrant planting different species than already occur on-site.

The soil profile, groundwater well data, other hydrologic indicators and existing vegetation were used to evaluate (1) the potential for the mitigation areas to support wetland and riparian vegetation, and (2) the best target plant community.

Stream channel widths and depths, and the widths of riparian wetlands were determined from the surveyed topographic maps. Stream water depths were measured at each HW Restoration area transect between April and June, and at the Culvert Enhancement area in April. The floodplain morphology in the Culvert Enhancement area (OHW, 2-year floodplain, low terrace) is fairly well defined and these features were used to characterize planting zones and general hydrology, with no additional hydrological data collected.

The ordinary high water level (OHW) on the reservoir was identified as the top of the reservoir outlet culvert (2,261.9 feet above Mean Sea Level [MSL]), with the dead pool elevation corresponding to the culvert bottom (2,258.9 feet above MSL).

2.3 Ground Water Wells

Six shallow ground water wells were installed in the HW Restoration area (two in the upper restoration segment, three in the middle segment and one in the lower segment), and two in the adjacent reference area. The wells were installed to depths between 4 and 5.8 feet, according to standard NRCS protocols (NRCS 2008). Each well consisted of a 2.5- foot- long screened section that was connected to an unscreened riser. The bottom cap and screened section were surrounded by a sand pack, with a minimum of six inches bentonite along the unscreened riser. A bentonite-soil mixture was used to cap the well.

Wells were installed on April 30 and monitored on the following dates:

- April 30 (4 hours post-installation),
- May 5, 14, 19 and 27, and
- June 3.

Weather conditions were recorded on each monitoring date, along with antecedent precipitation as recorded at the nearby Bonner's Ferry weather station. The antecedent precipitation was used to identify if the observed ground water levels reflect "normal," wetter or drier conditions than usual, and if any legacy effects from the hot, dry 2015 growing season are apparent. The wells will continue to be monitored throughout the 2016 growing season. Wells will be monitored weekly through June and biweekly through the end of September, or as needed for Plan implementation, with the water table height and degree of change between April and mid-summer of the greatest concern for species selection.

Neither the original reservoir construction nor the proposed restoration/enhancement previously changed, or is expected to change, the proposed mitigation area hydrology. As a result, the wells were not installed to determine success, but instead were used in conjunction with soil redoximorphic features to determine the plant species most suited to each planting area, and identify the degree to which irrigation is necessary to successfully establish the proposed woody plants.

3.0 EXISTING SITE CONDITIONS

3.1 Landscape Setting and Land Use

The Highland Flats site is located in the Rocky Mountain Forests and Rangeland Land Resource Region (LRR E), within the Inland Maritime Foothills and Valleys Level IV ecoregion of the Northern Rockies. The undisturbed areas of the site and adjacent lands are naturally dominated by coniferous forest (western larch, western red cedar, pines, spruces, firs and Douglas fir).

The Farm is located within an area zoned for agricultural and forestry use, on a property previously used for the production of Christmas trees. Adjacent properties were also previously used primarily for Christmas tree production, and have now been mostly converted to production of trees for landscaping purposes.

The Highland Flats Farm is currently used to grow trees that are processed into essential oils sold for health and wellness benefits. The oils are distilled on-site. The process is conducted under a "seed to seal" program in which each step, including the planting and growing of trees, is closely monitored to ensure that no constituents that could adversely affect the product composition are introduced. As a result, herbicide use is prohibited on the facility and only organic methods of weed control used. Manual removal via digging is the most common method used.

Trees within the Essential Oils property are not irrigated. The reservoir was built to provide a source of cooling water for the tree oil distillery. Almost all of the water pumped from the reservoir is returned unused, with only a small amount drawn and consumed in a closed loop distillation process. The water is used for cooling during the winter and spring, with reservoir withdrawals discontinued once oil distilling ends.

The land bordering the unnamed stream downstream of the reservoir was acquired by Essential Oils in 2015. It was logged prior to the property acquisition. The property east of the stream was logged prior to 2012, and the property west of the stream logged sometime between July 2014 and Essential Oils' acquisition in 2015.

The mean annual precipitation at the closest NOAA site for which WETS data is available (Bonner's Ferry) is 21.56 inches (NOAA 2016). The Highland Flats site elevation is higher and precipitation according to the PRISM data is also higher, with an average of 29.28 inches between 1986 to 2015 (OSU 2016). The WETS data is calculated specifically for wetlands and provides not only long term averages but also a probability analysis of the range of conditions that could occur within a "normal" year. The PRISM data is modelled over a grid of 1 km^2 cells and provides a closer estimate of actual average site conditions, but lacks a probability analysis. Both provide key information necessary to characterize individual site hydrology, and they are both included in Table 2.

Based on the Bonner's Ferry WETS data, the 2015 precipitation was above "average". However, this was mostly the result of a very wet December and precipitation during most of the growing season was below or at the low end of "average." Additionally, temperatures were mostly 3.5 to 8

degrees Fahrenheit higher throughout the growing season resulting in a net drier than usual condition. Likewise, the 2106 three-month antecedent precipitation prior to the April 2016 ground water examination was within the "normal" range (5.42 inches actual vs. 4.68 inches average[1]).

Table 2. Comparison of Long Term Monthly and Annual Precipitation Between the Prism Site-Specific Data and the Bonner's Ferry, Idaho WETS Average and Range to the Actual Monthly Total Values for 2015 and 2016. The shaded cell represent the values for the 3-month period prior to the ground water examination on April 30, 2016.

Month	PRISM-Site Specific	WET-Bonner's Ferry				
	30-Year Average (inches)	30-Year Average (inches)			Individual Year Monthly Totals (inches)	
		Average	30-70% Range		2015	2016
January	3.50	2.70	1.62	3.28	2.34	2.64
Feb	2.35	1.77	1.12	2.14	2.90	1.56
March	3.02	1.49	0.93	1.80	3.89	3.48
April	2.05	1.42	0.86	1.73	1.06	0.38
May	2.44	1.76	1.07	2.12	1.21	2.08
June	2.47	1.62	1.07	1.95	0.81	1.04
July	1.18	1.02	0.53	1.27	0.43	
August	0.96	1.07	0.48	1.31	0.99	
September	1.31	1.16	0.58	1.42	0.51	
October	2.25	1.61	0.79	1.97	0.73	
November	3.97	3.03	1.82	3.68	3.60	
December	3.79	2.91	1.89	3.50	5.90	
Total	29.28	21.56	18.76	23.84	24.37	

[1]Ground water levels were examined on the last day of April and thus the months of February, March and April were used to identify the 3-month antecedent precipitation levels as per the protocols provided in the NRCS Engineering Field Handbook, Chapter 19: Hydrology Tools for Wetland Determination (1997, as revised in 2011).

However, temperatures were from 2 to 6.3 degrees Fahrenheit higher than normal each month of 2016. April was overall both a very dry month (0.38 inches precipitation) and a hot one (6.3 degrees hotter than average). There was no precipitation the day of the ground water well installation and a total of 0.04 inches during the week during which the April field examination occurred. As a result, it is likely that the ground water levels presented in this document are lower than "normal"

3.2 Unnamed Stream Overall Description

The unnamed stream begins on an adjacent property as the outflow from a NWI-mapped wetland (PEM1C). It flows 1,145 feet from the northern property boundary to an adjacent property line. The unnamed stream traverses a separate landowner's property before re-entering Essential Oils property near the Farm headquarters' driveway. There are approximately 1,100 lineal feet of stream between the driveway and the upper end of the reservoir. From the reservoir, the unnamed stream flows south to slightly southwest for approximately 2,300 feet downstream of the impoundment and enters Fall Creek.

The unnamed stream can be divided into several segments, as depicted on Appendix A, Figure A-3:

- The upper headwater section between the northern property line and adjacent property, which includes both the HW Restoration and HW Remnant areas,

- The middle section between the Essential Oils driveway and the reservoir, which contains both the Reservoir Reference and Reservoir Mitigation areas, and

- The lower section between the reservoir and Fall Creek, which contains the Culvert Enhancement area.

Fall Creek below the junction with the unnamed tributary flows into Deep Creek, which flows into the Kootenai River. Additional details about the stream outside of the Essential Oils property can be found in the Conceptual Plan.

There are no NWI-mapped wetlands in the area where the reservoir was constructed or for approximately 2,000 feet downstream of it, or until the unnamed stream enters the Fall Creek floodplain. The stream upgradient of the reservoir is not mapped on the NWI, but a 0.90 acre seasonally flooded emergent marsh (PEM1C) occurs approximately 3,400 feet upstream. This wetland occurs north of the Essential Oils property.

The presence of fish in the unnamed stream is unknown. Because it dries in the summer, it is likely not fish-bearing. Fall Creek is known to contain a variety of trout species. The IPaC Report identifies one federally listed species in the area – the threatened grizzly bear (EcoWest 2016). There is no mapped critical habitat for any species in or adjacent to the project area. Black bear does occur within the vicinity and likely occurs on the property, but the main grizzly bear habitat is located at higher elevations. There have been sporadic sightings of grizzly bears near Sandpoint,

Idaho, primarily during very dry summers when food is scarce and the bears roam further in search of food. An adult male grizzly bear was observed in residential areas near Sandpoint in Summer 2015, but it was trapped by the USFWS and re-located back to its more typical mountain habitat.

Other wildlife species observed or thought to occur on the property include a variety of migrating waterfowl (bufflehead, wood duck, mallard, Canada goose) that use the constructed reservoir for resting during spring migration and mammals such as moose, Rocky Mountain elk, white-tailed deer and wolverine (Brett Packer, pers. comm, L. Gecy, field observations.). Sensitive birds that have been observed include the bald eagle and calliope and rufous hummingbirds.

3.3 Headwater (HW) Restoration Area

3.3.1 Overview

The HW Restoration area occurs along the entire extent of the 1,145-foot-long unnamed stream between the Essential Oils northern property line to a fence line separating the Essential Oils property from an adjacent landowner. This "headwater stream and adjacent restoration area" can be divided into four segments.

The first HW Restoration segment extends 265 feet from the northern property line to a small 12-inch field road culvert. The segment was historically ditched (date unknown, but prior to 1992). The channel is 1.67 to 2.0 feet wide with a silt bed. There is a small wetland bench adjacent to the stream between approximately 3 to 5 feet wide, bordered by a short, relatively steep slope to the top of the bank. The overall channel, adjacent wetland bench and side slope range between 6 to 13 feet in width. There is an additional 8 to 18 feet of mesic riparian habitat on each side of the channel plus a small upland riparian fringe (5 to 6 feet) on the east side of the channel, for a total riparian width between 54.6 feet at the upper end of the segment to 38.4 feet at the farm field dirt road.

Restoration segment HW-2 extends approximately 150 feet downstream of the farm field road. This section is straighter and more ditch-like than segment HW-1. The total channel and side slope width is 3.3 feet with no bordering wetland bench. The total riparian width including the channel ranges between 36.6 feet at the upper end below the culvert to 63.0 feet at the lower end where it abuts HW Segment 3 (HW-3).

The wetland area begins to expand below HW-2, as a second unnamed tributary enters the wetland near the upper end of HW-3. A small remnant mixed wetland forest, shrub and wet meadow patch remains to the west of restoration segment HW-3 as the unnamed stream flows to the east of the residual patch. This remnant wetland is hereafter referred to as the HW Reference wetland. The unnamed stream channel width and depth is reduced as the flow spreads over a wider area in HW-3. The channel form is regained near the property line where an approximately 3-foot wide channel occurs. The portion of HW-3 where the flow is spread out (HW-3a) is 580 feet long with a total riparian width between 80 to 230 feet, of which 60 to 90 feet represents the mitigation area and the remaining width represent the reference wetland. The portion of HW-3 where a more defined single channel form occurs (HW-3b) is 150 feet long with a total riparian width of between 80 and

140 feet, of which 30 to 44 feet are within the mitigation area and the remainder within the reference wetland.

3.3.2 Vegetation

There are four general habitat types in the HW Restoration area:

- Reed Canary Grass-Dominated Emergent Marsh (PEM)
- Wetland Shrub (PSS)
- Mesic Riparian Shrub
- Herbaceous Weeds.

The emergent marsh habitat is dominated almost exclusively by reed canary grass (*Phalaris arundinacea,* FACW, hereafter referred to as RCG) . Emergent marsh (PEM) occurs along the channel length in each of the HW segments and comprises the dominant habitat type within HW-3a. RCG cover ranges between 40-50% cover along the channel (76 to 96% relative cover) to an average of 30% in the wider HW- 3a mitigation area. Here, there is more bare ground, as well as greater microtopographic variation which has allowed some other species to establish. Relative RCG cover in the HW-3a wetland area ranges from 77 to 97%. Other species that occur in HW-3a with greater than 1% cover include common tansy (*Tanacetum vulgare,* FACU, 1.5%) and creeping foxtail (*Alopecurus arundinaceus,* FAC, 3%). Species that occur but that provide less than 1% cover include creeping thistle (*Cirsium arvense,* FAC), field horsetail (*Equiseteum arvense,* FAC), creeping bent (*Agrostis stolonifera,* FAC), orchard grass (*Dactylis glomerata,* FACU), linear-leaved candy flower (*Montia linearis,* FAC), buttercups (*Ranunuculus acris, R. orthorhynchus,* FAC and FACW), and water plantain (*Alisma triviale,* OBL).

Wetland shrubs occur as scattered individuals along the channel side slopes in HW-1 and HW-2. providing 5% cover in HW-1 and less than 1% in HW-2. Species that occur along the slopes include red-osier dogwood (*Cornus sericea = C. alba,* FACW), gray willow (*Salix bebbiana,* FACW) and Douglas's meadowsweet (*Spirea douglasii,* FACW). These shrubs occur between the RCG PEM and the mesic riparian habitat on the bank top.

The majority of the HW-1 riparian area is dominated by an intermixed mesic shrub and mesic weed community. The mesic shrub community comprises 15% of the area and is dominated by Douglas's meadowsweet, snowberry, RCG and tansy. The shrubs provide an average of 35% cover, with 19.2% cover of tansy and RCG. The shrub patches are interspersed with mesic weeds dominated by tansy, RCG, and hawkweed, with hawkweeds becoming dominant in areas that are slightly compacted. Total cover in the mesic weed patches averages 40% with abundant bare ground. The mesic weed community grades into a slighter higher narrow strip of upland weeds on the east side of the channel. This upland weed community is dominated almost exclusively by tansy with some bracken fern (*Pteridium acquifoilum,* FACU). There are two large tansy patches on the west side

of the channel that may be difficult to manually remove due to the presence of substantial anthills.

The HW-2 segment is mostly bare, with 10% cover east of the channel and 30% west of it. The dominant species are RCG, tansy and hawkweed. The HW-4 segment outside of the channel is dominated by a similar herbaceous weedy community (40% total cover with tansy the dominant species).

Trees are sparse in the HW Restoration area and consist of two sapling size grand fir at the northern property line and young lodgepole and white pines (3 feet tall and occurring sporadically in the shrub layer of HW-1 and 2 near the channel).

Table 3. Current Habitat Types and acres in the HW Restoration Area.

Mitigation Area	Current Habitat Type				
	RCG PEM	PSS	Mesic Rip Shrub	Herb Weed	Total Acres
Headwater					
1	0.06	<.01	0.02	0.15	0.23
2	0.01	<.01	0	0.12	0.13
3a	0.85	0	0	0.09	0.94
3b	0.03	0	0	0.21	0.24
Total	0.95	<.01	.02	0.57	1.54

3.3.3 Soils

Both the HW Restoration and adjacent reference areas are underlain by Rubson soils. Rubson series soils are deep, well drained soils formed from a mix of glaciolacustrine sediments and volcanic ash. They typically occur on terraces. The upper profile (A horizon, 0-11") is slightly acid (pH 6.1-6.2) and slightly to moderately acid below (B horizon, pH 5.9-6.4). Rubson soils are characterized as ashy silt loams often used for agriculture or forestry where level, and for forestry where slopes are steeper. The subsoil is typically alkaline (C horizon, 7.7 to 7.8 pH) below 58 inches.

Soil characteristics in PEM portions of the HW Restoration area vary upon the degree of spring inundation, but all tend to have an upper dark surface (10 YR 2/2) with a depleted layer below 18 inches with abundant redox concentrations. Exceptions occur where a shallow clay lens occurs; there the redox features tend to start deeper in the soil profile, indicating both a slightly perched surface water and a ground water hydrology.

The Mesic Riparian soils are typically bright (10YR 5/4 or 4/3), but with 2 to 5% redox concentrations occurring below 20 to 24 inches. The upland weed soils are similar to the mesic riparian area except that they are clay loams instead of silt loams and are more compacted.

The soil profiles are similar to those in the same reference community types (see Section 3.6.1), indicating likely acidic mitigation area topsoils. Spring water tables are deeper in the mitigation site than the adjacent reference (see Figure 1 on the next page).

3.3.4 Hydrology

The channel bed in all three segments consists of silt. There were 6 inches of water in the channel near the northern property boundary at the time of the February site visit and 3 inches in April. Even though below the junction with the second unnamed tributary, the channel form varies in HW-3a, and the April channel water depth ranged between 2.5 and 10.5 inches in this segment. The April channel water depth in the narrower HW-3b was 5.7 inches. By the beginning of June, the channel was dry in all segments except HW-3a, where there was still some shallow inundation (3.5 inches).

The April ground water levels in the PEM ranged from saturated or shallowly inundated (no wells installed) to 5.1 to 17.2 inches below the soil surface. The mesic riparian ground water levels were below 20 inches at the end of April.

Figure 1 depicts the changes in ground water levels between April 30 and June 3. A rapid decline in water tables was noted during May corresponding to the drier and warmer spring described in Section 3.1.

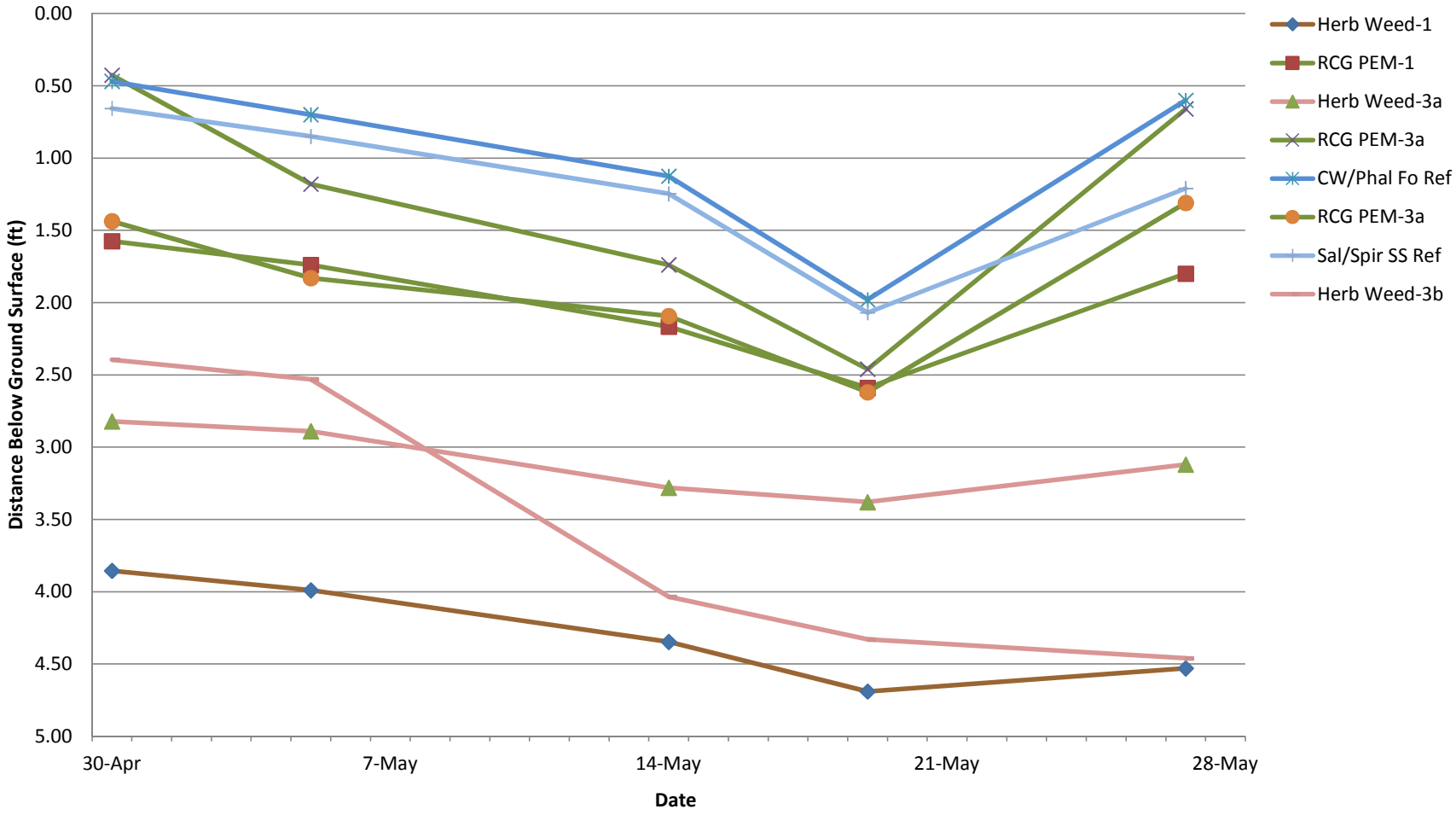
3.4 Culvert Enhancement Area

3.4.1 Overview

Most of the unnamed stream downstream of the reservoir is located within a confined valley with only small adjacent wetland benches. The dominant canopy species is western red cedar (*Thuja plicata*, FAC), with scattered western larch (*Larix occidentalis*, FACU) and black cottonwood (*Populus trichocarpa = P. balsamifera* spp. *trichocarpa*, FAC). The red cedar dominates the entire riparian zone and is particularly prevalent near the stream channel. Other tree species occurring occasionally in the riparian zone include grand fir (*Abies grandis*, FACU), Engelmann spruce (*Picea engelmannii*, FAC), western white pine (*Pinus monticola*, UPL), lodgepole pine (*Pinus contorta*, FAC), western hemlock (*Tsuga heterophylla*, FACU), aspen (*Populus tremuloides*, FACU) and paper birch (*Betula papyrifera*, FAC). These species become more frequent with distance from the stream, although the red cedar continues to dominate the full riparian zone.

The area immediately upstream of the culvert at the junction between the unnamed tributary and the Fall Creek floodplain has a larger 2-year floodplain and adajcent low terrace than other areas on the unnamed stream. This area is also more open to sunlight than other riparian areas along the stream (partially as a result of the previous owner logging), providing openings in which shrubs and

Figure 1. HW Restoration and Reference Area Ground Water Levels



deciduous trees can be established.

Most of the sediment from the impoundment failure has been either removed from the system (via culvert cleaning) or flushed through. There is some sediment remaining around the culvert (from 0 to 6 inches deep within a 3 to 8 feet wide by 24 foot long area [total of 140 square feet]).

3.4.2 Vegetation

The canopy cover within the Culvert Enhancement area ranges between 15 to 40% and is dominated by cedar with some spruce and paper birch. Most of the cover is from trees on the adjacent hillslope but there are a total of 30 mature trees and 10 saplings within the mitigation area, for an existing tree/sapling density of approximately 200 trees and saplings per acre.

Shrubs along the stream channel are sparse, but include some scattered speckled alder (*Alnus incana*, FACW) and red-osier dogwood that overall provide 1-2% cover. Within the channel itself, a number of wetland plants have established in scattered locations including skunk cabbage (*Symplocarpus foetidus*, OBL), bittercress (*Cardamine breweri*, FACW), and American speedwell (*Veronica americana*, OBL), along with two small patches of RCG. The RCG occurs directly upstream of the culvert where the reservoir sediment was deposited, and was not observed elsewhere. The two RCG patches are 2.5 by 10 feet and 1 by 10 feet in size.

Between the stream channel/adjacent small floodplain and the upland hillslope, there are a few small terraces (estimated as being 3 to 5-year flooplain surfaces). Although the terraces predominantly represent upland, they are close enough to the channel to support a functional mesic riparian community. In a slightly higher portion of the terrace closest to the culvert, a dense snowberry community has developed in a 374 square foot portion. Elsewhere, the terraces remain open with a sparse cover of dicots and ferns (less than 5%), although the ferns were still emerging in April and will likely provide greater full growing season cover. Species observed on the terraces include streambank violet (*Viola glabella*, FACW), wild sasparilla (*Aralia nudicaulis*, FACU), starry false solomon's seal (*Smilacina stellata=Maianthemum stellatum*, FAC), three-leaf foamflower (*Tiarella trifoliata*, FAC), enchanter's nightshade (*Circea alpina*, FAC) and lady fern (*Athyrium filix-femina=Athyrium cyclosorum*, FAC). A few FACU and UPL hillslope species also occur sporadically on the terraces including western trillium (*Trillium ovatum*, FACU), Queens's cup (*Clintonia uniflora*, UPL) and trailfinder (*Adenocaulon bicolor*, UPL).

The only non-native invasive species observed were the RCG, which is limited to the immediate vicinity of the culvert, and some scattered bracken fern.

3.4.3 Soils

The Culvert Enhancement area is mapped as being underlain by Artnoc soils. Artnoc soils are deep, well drained silt loams that occur on terrace escarpments. They were formed from glaciolacustrine sediments. The upper profile (0-8") can be moderately acid (pH 5.6-6.0), with the profile between 8 to 33 inches only slightly acid (pH 6.2-6.4). The subsoil is typically alkaline subsoil (C horizon,

7.7 to 7.8 pH) below 33 inches.

Soils, as examined in the field, are silt loams with some sandy loam intermixed in the upper profile, grading to clay loam in the subsoil. The floodplain soils are dark brown (10 YR 4/2 or 3/2) with redox concentrations in the upper 2 to 4 inches. Terrace soils are brighter (in the upper layers (i.e., 10 YR 5/3) grading to a dark brown in below 9 inches. Redox concentrations and depletions occur below 12 to 18 inches (depending on the location within the terrace).

There was no direct reference area to match the Culvert Enhancement area soil profile to, so the soils were compared to the mapped soil profile description. Soils within the floodplain and and adjacent terraces appear to match the adjacent Seelovers soil profile more closely than the mapped Actnoc. This is reasonable as the mapped break between the Actnoc and Seelovers soils occurs just downstream of the culvert. The primary difference between the two, as far as plant community support, is that the Seelover soils do not become alkaline in the lower profile.

3.4.4 Hydrology

The stream channel immediately downstream of the reservoir is approximately 13 feet wide, but it quickly narrows to a 7-foot channel. The remainder of the stream channel between the reservoir and the forestry road culvert ranges between 5 to 7 feet wide, except at the scour hole. The channel in the enhancement area ranges in size between 4.1 feet at the at the culvert to 6 to 8 feet upstream, although the width varies within the mitigation area. The channel bed is silt, which is the natural channel bed material in the area.

Within the enhancement area, the adjacent floodplain is disjunct and ranges in size between 3 and 7 feet wide and up to 15 to 40 feet long where it occurs, to non-existent where the hillslope directly abuts the channel. The low terraces are from 50 to 100 feet long, but narrow (10 to 15 feet wide) and occur within one to two feet of the channel OHW mark. Within the Culvert Enhancement area, there are four floodplain and three terrace surfaces in which canopy shade is less than 25-30% and another approximately 100 lineal feet of small (1 foot wide each side of the channel) adjacent floodplain surface.

Water tables in the floodplains were at or within 10 inches of the surface during the April site visit. Ground water levels in the low terraces ranged from 12 to 18 or more inches below the soil surface. The depth of water in the channel was 6 inches immediately upstream of the culvert and 4 to 6 inches elsewhere in the mitigation area.

3.5 Reservoir Mitigation Area

3.5.1 Overview

Although the constructed reservoir is primarily bordered by steep side slopes (30 to 40% grade), there are some parts of the reservoir characterized by lower gradient surfaces on which obligate wetland plants are beginning to naturally establish. These areas occur at the northern end of the reservoir where the unnamed stream enters, near the pump house and along scattered other portions of the "shoreline". There is a minimum of 0.09 acres of lower gradient surfaces and 230 lineal feet around the reservoir shoreline suitable for wetland plant establishment as evidenced by (1) a combination of slope and soil characteristics, and (2) the fact that perennial wetland plants have established and flowered in these areas, indicating sufficient growing season soil moisture retention to support wetlands.

3.5.2 Vegetation

Vegetation above the OHW level of 2,261.9 feet above MSL is dominated by a seeded upland clover and fescue mix that established over the 2015-2016 winter, providing 80% cover on most of the upland slopes. Between the OHW level and a point approximately 2,259 feet above MSL, wetland plants are establishing in the two locations depicted in Appendix B-3, as well as in scattered locations along the remainder of the western reservoir edge. Species observed between the OHW and the late April 2016 water level included sword-leaf rush (*Juncus ensifolius*, FACW), willow doc (*Rumex salicifolius*, FACW), three-square (*Schoenoplectus pungens*, OBL). Three square, cattail (*Typha latifolia*, OBL), water plantain (*Alisma triviale*, OBL, verified July 2016), and RCG occur in the area below the April water level and were inundated by up to 3 feet of water at the time of the site visit.

Overall, total April cover was low (less than 10%), but was up to 15% in the northern, upstream portion of the reservoir (upper reservoir). Water plantain and sword rush provide the most cover in the area closest to the pump house (lower reservoir). RCG is the dominant species establishing in the upper reservoir. The current low cover combined with suitable surfaces for wetland plants provides an excellent opportunity to ensure that as a new plant community establishes, it is dominated by native plants. The open nature of the reservoir also provides an opportunity to establish willows, which are limited elsewhere in the system due to the typical dense conifer cover along the stream.

Although currently bare to sparsely vegetated, there are 0.061 acres of area suitable for emergent marsh and 0.036 acres suitable for wetland shrubs.

3.5.3 Soils

Soils were examined near the OHW line, where they were saturated to shallowly inundated in April. Here the soils exhibited signs of newly flooded soils, such as retaining original soil bright colors (10 YR 3/3 or 4/4), but with the presence of redoximorphic features where water tables fluctuate. Redox features, both concentrations and depletions, were most abundant in the upper 8 to 10 inches. As

a result of the excavation, some subsoil was exposed and soils are anticipated to be less acidic and more alkaline than in the HW and Culvert Mitigation areas.

3.5.4 Hydrology

The reservoir OHW level is controlled by two 36- inch CMP culverts at the southern end, allowing flow to exit the reservoir at elevations between 2,261.9 feet above MSL and 2,258.9 feet above MSL. The reservoir is managed as a flow through system with water used for cooling in a non-consumptive manner (with only minor amounts of the drawn water evaporating during the cooling process) and the remaining water returned just upstream of the impoundment berm. The low water level varies from year to year, depending on natural variations in precipitation and stream inflow, but the presence of obligate wetland perennial plants at elevations of 2,259 feet indicate that these areas remain at least saturated during the growing season.

3.6 Reference Areas

3.6.1 Headwater (HW) Reference

The HW Reference area is located west of the unnamed tributary near the northern property boundary. The stream channel generally forms the boundary between the HW Reference and Restoration areas, with the channel described in Section 3.3. The Reference area consists of a 2.4 acre open forested/scrub shrub wetland (PFO/PSS) interspersed with patches of mesic shrubs on higher microtopography and small patches of emergent marsh in small depressions. It is bordered by agricultural fields and fallow areas to the west and by the proposed HW Restoration area to the east.

The canopy is dominated by black cottonwood with aspen co-dominating in patches of slightly locally higher topography. Conifers such as lodgepole pine, western white pine, larch and cedar occur sporadically. The sapling layer is patchy. Where it occurs, it is dominated by alder and gray willow.

Douglas's meadowsweet forms a dense shrub layer, with snowberry co-dominant on slightly higher microtopography. Other shrub species occurring include red-osier dogwood, alder, and black hawthorne.

The understory is heavily dominated by RCG which has a mean cover of 32.4% overall, and a cover range of 7 to 60%. Early growing season RCG relative cover is high, with 89% of the herbaceous layer dominated by the species. The only microsites in which RCG cover is either less than 10% total cover or 50% relative cover is where the area is both inundated by 4 or more inches of water AND there is 30% or more canopy cover. This situation occurs on the west side of the reference area where a second tributary joins the main unnamed tributary resulting in some shallow ponding. Elsewhere, the RCG provides a minimum of 25% early growing season cover.

Other species in the herbaceous layer include tansy and orchard grass along upland edges. Field horsetail and creeping foxtail occur where ponding occurs. Adding in the other non-native invasive species results in a mean non-native cover value of 33.7%.

Soils within the PFO/PSS are generally silt loams with either a shallow clay lens or pockets of silty clay within the profile, and then grading to a sandy loam at depths below 4 feet. Redox concentrations are abundant throughout most of the profile with the greatest concentration between 18 and 36 inches below the soil surface. A depleted matrix (10 YR 7/2) begins to occur approximately 18 inches below the soil surface. In the mesic shrub area, soils are brighter (10 YR 4/3) and lack redoximorphic features in the upper 2 feet.

Late April wetland water levels ranged from ponded or saturated near where the two small tributaries joined to between 5.6 to 7.9 inches below the soil surface. Ground water levels in the mesic shrub patches were below 20 inches.

3.6.2 Reservoir Reference

The unnamed stream traverses a separate landowner's property before re-entering Essential Oils' property near the Farm headquarters' driveway. There are approximately 1,100 lineal feet of stream between the driveway and the upper end of the reservoir. The second reference area is located along this portion of the unnamed stream.

The stream channel ranges between 3 feet wide at the upper end of this section to 5-7 feet wide near the reservoir. The channel is bordered by a fairly narrow fringe of emergent marsh (2 to 13 feet wide), that is dominated almost exclusively by RCG (typically 50% cover and 95-100% relative herbaceous layer cover). Other species observed sporadically include stinging nettle (*Urtica dioica*, FAC), lady fern, and sedges.

The RCG marsh grades into a mixed scrub-shrub/emergent marsh wetland (PSS/PEM) and then into a mesic riparian shrub community, of which parts are wetland and parts are upland. The wetland is wider on the west bank than the east where the hillslopes are steeper. The total vegetated wetland width ranges from 7 to 15 feet, with a full width of up to 28 feet (including both channel and wetland), but typically narrower than that.

The PSS/PEM is typically dominated by Douglas' meadowsweet and RCG, with a very open canopy. In the mesic shrub community, snowberry co-dominates with the meadowsweet. The canopy includes a mix of alder and cottonwood, with most of the shade coming from trees on adjacent surfaces. Other species occurring in the shrub communities include alder, with scattered narrow-leaved or coyote willow (*Salix exigua*, FACW) and black hawthorne (*Crataegus douglasii*, FAC).
Most of the riparian canopy cover is provided by trees on upland surfaces, although alder and western white pine provide cover directly in the wetlands. Upland canopy species include paper birch, spruce, and scattered grand fir and hemlock. Understory species within the mesic riparian and adjacent upland include streambank violet, wild sasparilla, starry false solomon's seal, and fragrant bedstraw (*Galium triflorum*, FACU).

In contrast to the HW Reference area, the Reservoir Reference mesic shrub communities are devoid of RCG, which likely reflects both the more abrupt topographic breaks between communities and the coniferous tree canopy which provides greater shade.

Soils are silt loams. In the wetland areas, soils were either mucky or dark colored with abundant redox concentrations (10 YR 2/2, 2-5% 10 YR 5/8 redox) in the upper 12 inches. Subsoils tended to be bright (10 YR 4/4). Soils underlying the upland portions of the mesic riparian community and the upland forested riparian were generally uniformly bright colored (10 YR 4/4).

April wetland ground water levels ranged from saturated to 10 inches below the soil surface. Ground water levels were at or below 15 to 20 inches in other communities.

4.0 DETAILED PLAN

4.1 Headwater (HW) Restoration Area

4.1.1 Objectives/Acres

The entire upper 1,145 feet of the headwater stream between the northern property boundary and the southern property fenceline will be restored. The area in which restoration will occur is depicted in Appendix B-1 and will encompass all of the area on either side of the unnamed stream in segments HW-1 and HW-2 (which is also outside of the Tree Farm fields) and all of the area east of the unnamed stream in segments HW-3a and 3b. The remnant riparian wetland adjacent to the HW Restoration area is not included in the acreage to be restored. Instead this area will serve as a reference for species best suited to the site conditions, allowing the existing 2.4 acre intermixed forested, shrub and herbaceous wetland to be expanded to a total riparian area of 3.9 acres.

Specific goals are to:

- Establish forested and scrub shrub communities similar to those in the adjacent reference wetland where hydrological conditions are suitable.

- Re-grade the HW-2 segment to re-establish suitable hydrologic conditions for wetland and riparian communities and to eliminate the ditch-like form.

- Establish additional mesic riparian and upland habitat along the edges of the mitigation area.

Out of the 1.54-acre mitigation area, the habitat acreage goals are for the restoration of 0.87 acres of areas dominated by a RCG community to a mix of forested-wetland shrub (FO/SS) and wetland shrub (PSS), with additional 0.11 acres of wetland scrub shrub/ emergent marsh established along the stream channel. Because of the RCG, woody plant communities will be favored over

Table 4. Comparison of Current and Proposed Final Habitat Types and acres in the HW Restoration Area.

Current Habitat	Proposed Final Habitat Type						
	RCG PEM	Mixed FO/SS and SS-terrace	Channel/Floodplain		Mesic Rip Shrub	Upl Rip (woody)	Herb Weed
			PSS	PEM/OW			
Current	0.92	0	< 0.01		0.02	0	0.60
Final	0	0.87	0.06	0.05	0.34	0.22	0
Total	-0.92	+0.87	+0.06	+0.05	+0.34	+0.22	-0.60

herbaceous, except in small microdepressions where inundation persists for longer periods in the spring. The wetland areas will transition into a mesic riparian shrub community that contains many of the same species but with greater amounts of facultative and facultative upland species. Upland riparian trees and shrubs will be used in select areas along the current farm dirt access road.

4.1.2 Erosion Control

Fiber rolls will be installed prior to the onset of grading or soil decompaction activities in HW-2, the upper portion of HW-3a, and HW-3b to prevent any sedimentation into the channel or adjacent wetlands. In HW-2 they will be installed at the base of the channel along the entire length of the area to be graded and staked as described in Section 4.4.1. Fiber rolls will also be installed across the channel at the downstream end of HW-2 and along the edge of grading in the adjacent portion of HW-3a. Grading will not occur in HW-3b, but the entire area will be decompacted. In this segment fiber rolls will be placed (and staked) along the upper channel bank, with all decompaction occurring to the east of the rolls.

The fiber rolls along the channel in HW-2 will remain in place until the site has been fully planted. The fiber rolls on the upper riparian surface in HW-3a and 3-b will be removed to allow for the weed solarization material to be placed close to the ground surface.

4.1.3 Grading

The elevations of HW-2 will be changed to:

- Reduce the upper surface elevations to match those of the abutting reference area (at or slightly greater than 2,277 feet above MSL) to facilitate the establishment of similar community types, and

- Reshape the ditched channel form to create a small adjacent floodplain bench.

This will result in the lowering of riparian surfaces by 8 inches to slightly more than one foot and a change in slopes from a 1 to 2:1 to a 4:1 (at the channel) to greater than or equal to 10:1 elsewhere. There will be an estimated 209 cubic yards of material removed during the grading and transported to an upland disposal site located on the property near the Farm headquarters (see location on Figure A-4).

Topsoil depths in the proposed grading area (HW-2 and very upper end of HW-3a) range from 4 to 7 inches and are mostly silt loams, underlain by a compacted clay loam subsoil. During the grading process, the old weed seed-filled topsoil will be removed and a new clean topsoil applied. The new topsoil will be obtained from a recently logged parcel west of the Culvert Enhancement area (see location on Figure A-5). This area was selected on July 27, 2016 due to (1) a lack of non-native, invasive species growing on the soil, including tansy, RCG, hawkweeds, bracken fern and knapweed, and (2) the presence of a deep silt loam topsoil (8-10 inches deep).

Grading will occur according to the following steps.

1. Use a trackhoe stationed in the upland area outside of the channel to remove RCG and its associated sod from the channel where it has established in HW-2. The sod will be placed immediately in a covered container and transported to the designated upland disposal site.

2. If desired for other uses, strip the upper 6 inches of the topsoil from the area to be graded on each side of the channel and remove to either an upland storage location or its new place of use. If topsoil will not be used elsewhere, eliminate the separate topsoil stripping step.

Concurrent with, or immediately prior to this step, strip the clean topsoil to be used for the mitigation and transport to the HW Restoration area. If the topsoil stripping is separated from re-application by more than two days, or if windy, the topsoil will be covered or otherwise protected from the wind.

3. Remove from 8 to 12 inches of subsoil from the upper riparian surfaces on each side of the channel (up to 18 inches at high spots) and place the soil into a dump truck to be taken to the upland disposal site. To account for topsoil stripping and replacement, as described in steps 2 and 6, total excavation depths will be from 6 inches (areas at desired grade in which only topsoil replacement will occur) to 18 (occasionally 24) inches. Because the subsoil likely will not contain weed seeds, it may be usable for other uses, but it will not be suitable as a planting medium.

4. The channel bottom will remain at its same height and width. Pull the channel bank top back to a total width of 10 to 15 feet (to allow for a small within-channel bank), with a riparian surface elevation of slightly greater than 2,278 feet at the upper end of the segment and an elevation of 2,277 feet at the lower end of the segment. As a result, the current slight north to south slope within HW-2 will be retained. Grade the slope between the upper surface and the channel on the eastern side (where the distance over which the slope can be extended is greater), at a 10:1 slope, and the western channel side at a 4:1 slope. Figure 2 provides a representative cross section near the middle of the area to be graded showing the current and proposed elevations across the channel from west to east.

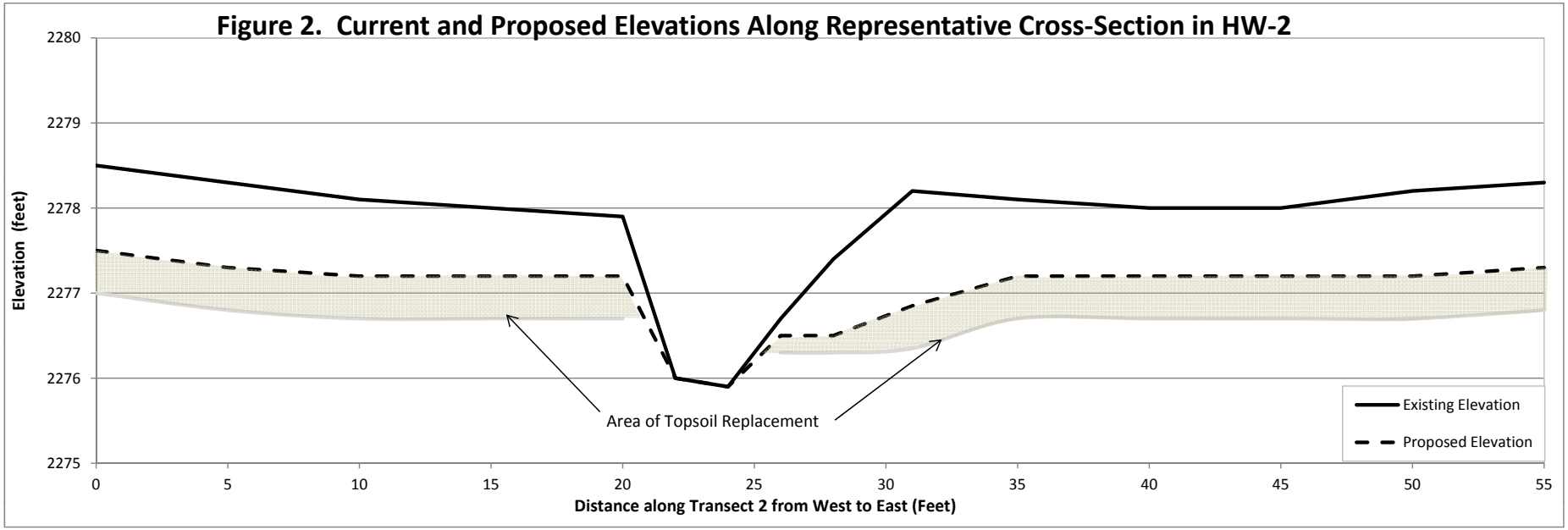
5. Decompact the surfaces both east and west of the channel using a disc, harrow or other similar tilling equipment suitable for breaking up the remaining compacted subsoil.

6. Apply six inches of the new, weed-free topsoil using a rubber tired loader being carefully to loosely place and firm, but not compact or roll the soil, working from the channel out to the access road as soil is placed.

7. Seed the graded areas. Because the new topsoil to be applied does not currently support weeds, black plastic film for site solarization will not be re-applied.

A Professional Wetland Scientist will be on-site to supervise all grading work.

Figure 2. Current and Proposed Elevations Along Representative Cross-Section in HW-2



4.1.4 Other Site Preparation

All of the areas labelled as Upland Riparian in Appendix B-1 and most of Segment HW-3b contain compacted soil and some areas contain wood chip remnants from previous mulching. These areas will be decompacted by a disc or harrow with up to 2 inches of the wood chips incorporated into the soil to improve the structure. The remaining wood chips will be set to the side and used to cover the solarization film edges along the road.

In HW-1, there are two large tansy plants that will interfere with the proposed weed control via solarization (i.e., too large to allow film to be adequately placed) and difficult to manually remove. These plants will be removed using a trackhoe that will remove the entire plants and place immediately in a container for upland disposal.

Small upland mounds (1-2 feet) occur in portions of the HW-3a area that may either interfere with the ability to adequately install the weed control solarization materials or otherwise effectively control the weeds, particularly tansy (a mound dominant). These mounds will be selectively removed as directed in the field by the Wetland Scientist using a small rubber-tired bulldozer or manually and placed on a rubber tired skidder. There are some small microdepressions in which water is retained longer during the spring. These areas will be avoided during all activities other than weed control to ensure that the form remains intact.

4.1.5 Weed Control

The mitigation sites are located on an organic farm and weed control will be through mechanical means. Solarization will be used for RCG and tansy control in most of the HW Restoration area. Heavy black plastic material (HDPE sheeting, 6 mil) will be used to cover all areas dominated by these species.

Mowing will occur prior to the plastic installation in HW-1 and HW-3a (if feasible and permits obtained) to ensure that the material can be placed in close proximity to the soil and trap the necessary heat. There was insufficient weed growth observed in April in HW-2 and HW-3b to require mowing prior to other activities and these segments will also be tilled. However, if necessary, mowing will be used in these segments. Any other items that might tear the barrier, such as sticks or rocks, will be manually removed, except as described in Section 4.1.4. In some areas a hand held, gas powered weed trimmer (weedeater or weed whacker) may be necessary to trim herbaceous vegetation around existing shrubs, along the channel edges, and in portions of HW-3a (if feasible and permits are obtained). No existing shrubs are to be removed during the mowing. It will be very important to conduct the mowing and trimming prior to any RCG seed set so that the activity doesn't result in increased seed dispersal.

Once the non-native vegetation has been trimmed close to the soil surface, or as feasible, black plastic will be placed over the areas infested by RCG, tansy and other non-native invasive species. In order to provide an additional weed buffer, the plastic will also extend outside the mitigation area to the road edge in Segments HW-2 through HW-3b. Either black plastic or wood chips will be used

to cover the pathway in HW-1. Because of the area involved (up to 1.5 acres), multiple plastic sheets will be required. The sheets will be placed so that they overlap by at least 4 to 6 inches to avoid gaps and anchored in place by landscape staples (also referred to as metal anchors), at a rate of one every 10 feet along the sheet edges. To facilitate subsequent partial planting, and potentially later grading, sheets will be installed so they match different planting areas as much as possible. The edges of the plastic near the dirt road will be covered by 4 inches of wood chips to cover the edges and additionally anchored by medium-sized rock (6 -12 inches) or cement blocks to prevent movement in the wind. Rock or blocks will also be hand placed selectively within the planting area to keep the sheets in place.

The plastic sheets will be cut around the scattered existing shrubs, shrub patches and small trees to ensure that they will be retained (primarily in HW-1 and portions of HW-2). Four inches of wood chips/shreds will be placed within the openings to prevent weed emergence. The areas around these plants will be periodically examined for the emergence of weeds, with manual removal of any emerging stems as soon as observed. If more than occasional stem emergence is observed, or more stems emerge than can be manually controlled, additional application of wood chips will occur.

The sheets will be examined on a weekly basis during the growing season and after any large storm or wind events to make sure that (1) they remain in place, and (2) any gaps or tears that appear are quickly covered by additional black plastic and anchored into the soil.

Except for the HW-2 area to be graded, the plastic will remain as is in the HW Restoration area between July and Fall 2017, when full planting will occur.

4.1.6 Planting

Habitats and Species. The two originally dominant communities (RCG PEM, Herbaceous Weed) will be primarily planted to a mix of forested-wetland shrub (FO/SS) and wetland shrub (PSS), and mesic riparian. The goal will be to prevent the RCG, once initially controlled, from re-establishing and dominating these areas by planting woody vegetation within 70% of the area, with openings for herbaceous vegetation within 30% of the area. The existing and expanded channel will be planted to a mix of emergent marsh and scrub-shrub habitat. An upland riparian woody plant community will border the other habitats at the upper and lower ends of the mitigation area.

The species used in the intermixed forested-wetland shrub (FO/SS) and wetland shrub (PSS) community will be the same as in the adjacent reference community. In the reference area, the canopy ranges from 10 to 40% with a mean of 20% cover, primarily from black cottonwood. Gray willow provides 10% average cover and the shrub layer cover averages 30% (primarily meadowsweet but with some snowberry and hawthorne). Similar percentages were used in the planting specifications listed in Table 5. Plants will be clumped in appropriate microsites with the willows placed around the near channel microdepressions and cottonwoods and hawthornes placed where slightly higher. The meadowsweet was ubiquitous in the reference area and will be planted throughout the adjacent HW-3a segment. Although plants will be clumped, average spacings of 5 feet for shrubs, 7 feet for tall shrubs and small trees (hawthorne and Gray willow) and 10 feet for

trees was used to determine planting numbers (averages of 436 to 1,742 plants per acre). The weighted mean density based on these spacings is 765 woody plants per acre.

Red-osier dogwood, coyote willow and Douglas's meadowsweet will be planted along the channel in existing and newly created benches and channel side slopes. They will be clumped in appropriate microsites, but at a rate of 1,742 plants per acre (an average 5 by 5 foot spacing) and a target coverage of 80%.

The primary species to be planted in the Mesic Riparian habitat will be Douglas's spirea and snowberry. They will be planted at a rate of 1,742 plants per acre (an average 5 by 5 foot spacing) and a target coverage of 80%. Even though an average spacing was used to determine the number of plants, they will be clumped in suitable microsites.

In the HW-1 upland riparian habitat, trees will be placed within a linear strip and a target density was not calculated. Instead the trees will be planted at an average spacing of 20 feet, for a total of 13 trees. In the HW-3b upland riparian, a mix of hawthorne, lodgepole pine and aspen will be planted. The trees will be placed at an average 10 by 20 spacing and the hawthorne at a 7 by 7 spacing, for an average density of 462 woody plants per acre.

Table 5. Number of Plants by Species to be Installed in the Headwater Restoration Area. Species name abbreviations are explained in the legend below the table.

Habitat Type	Acres	Cose	Crdo	Pico	Poba	Potr	Sabe	Saex	Spdo	Syal	Total
PFO/PSS	0.87		39		95		77		455		666
Channel PSS	0.06	27						40	11		78
Channel EM	0.05	To be seeded									NA
Mesic Rip	0.34								191	309	500
Upl Rip	0.22		21	25		25					71
Total	1.54	27	59	25	95	25	77	40	657	309	1,315

Species Name Legend:
Cose=Cornus sericea (red-osier dogwood)
Crdo=Crataegus douglasii (black hawthorne)
Pico=Pinus contorta (lodgepole pine)
Poba=Populus balsamifera (black cottonwood)
Potr=Populus tremuloides (aspen)
Sabe=Salix bebbiana (Gray willow)
Saex=Salix exigua (coyote willow)
Spdo=Spirea douglasii (Douglas's meadowsweet)
Syal=Symphoricarpos albus (snowberry)

Two seed mixes will be used in the HW Restoration area-a wetland/mesic mix and an upland mix (Table 6). The seed mixes include a variety of Idaho native species adapted to both the low pH Rubson soils that occur within the mitigation area (estimated as pH=6.2 from NRCS soil profile data) and the seasonal water table decline. Three acid-tolerant, sod-forming monocots were selected to anchor the mix -- meadow barley, a native bent grass and poverty rush. Other monocots added to ensure that all of the different microsites could be covered include Nebraska sedge, western mannagrass, Canada wild rye and creeping spikerush. All of the species are available from locally-collected seed

Table 6. HW Restoration Area Seed Mixes.			
Scientific Name	**Common Name**	**Indicator Status**	**Percent of Mix (% PLS)**
Wetland/Mesic Riparian Mix			
Hordeum brachyantherum	Meadow barley	FAC	35
Agrostis exarata or scabra	Bent grass	FACW/FAC	15
Juncus tenuis	Poverty rush	FAC	15
Carex nebracensis	Nebraska sedge	OBL	10
Elymus canadensis	Canada wild rye	FAC	10
Glyceria occidentalis	Western mannagrass	OBL	10
Eleocharis palustris	Creeping spike rush	OBL	5
Upland Riparian Mix			
Elymus glaucus	Blue wild rye	FACU	30
Elymus lanceolatus	Streamside wild rye	FACU	25
Bromus carinatus	Mountain brome	UPL	25
Hordeum brachyantherum	Meadow barley	FACW	20
No native herbaceous wetland plant species were observed in the reference areas. If subsequent summer field examination identifies other native species occurring within the site that are appropriate for seeding, they will be added to this mix and a short memorandum provided to EPA regarding the update.			

The upland seed mix will contain a mix of rhizomatous grasses adapted to previously disturbed sites and that also contain overlapping soil moisture requirements.

The seeding rate will be at a minimum of 98 live seeds per square foot for the wetland mix and 70 for the upland at a rate of 1.5 times the mix for broadcast seeding.

Timing. Bare-root planting will occur over a 2-year period, with the initial Fall 2016 planting in all areas to be graded with subsequent topsoil replacement. These areas will be:

- Both eastern and western portions of HW-2, and
- The upper portion of HW-3a.

These areas represent approximately 30% of the area to be planted. The remaining bare root planting will occur in 2017 when the weed control solarization period has ended. Seeding will occur in both Fall 2016 and 2017 as the black plastic is removed and other planting occurs.

4.1.7 Mitigation Area Sequencing

To ensure the greatest degree of RCG control within the HW Restoration area, weed control will need to be initiated as soon as possible in July. Both the wetland grading and mowing will require a 404 permit, or other approval, which was not issued until August (for mowing) and end of September (for grading). Therefore, weed control through solarization will be initiated in July, but wetland mowing, grading and other soil preparation will be deferred until late summer/fall. All planting and seeding will occur in the Fall. The key schedule items are to (1) initiate RCG solarization control, (2) ensure that all grading and soil work is conducted under low flow and not wet conditions, and (3) ensure that planting occurs when soils are moist and stock is dormant.

The following lists the order in which all activities described in Sections 4.1.2 through 4.1.5 will occur.

July Tasks

- Mow and use weed trimmer, as necessary and in upland and mesic areas only, to apply solarization materials
- Dig tansy in HW-1 upland, remove upland debris piles and excess wood chips
- Cover upland and mesic areas with plastic film

August Tasks

- Mow and add solarization materials to wetlands

Early Fall Tasks

- Remove black plastic where grading and soil decompaction will occur
- Install and stake erosion control measures (fiber rolls)
- Strip topsoil in HW-2 and upper HW-3a, if using elsewhere; if not skip step
- Concurrently (or immediately prior to), strip topsoil from upland donor site
- Grade HW-2 and upper HW-3a
- Decompact HW-2 subsoil
- Apply 6 inches topsoil in HW- 2 and upper HW-3a
- Remove fiber rolls in HW-3a and 3b, but leave along the channel in HW-2
- Broadcast seed and rake in

Late Fall Tasks

- Plant bare root trees and shrubs in graded and topsoil replacement areas (HW-2 and upper

HW-3a)

The initial planting of the above areas will occur in late October/early November 2016 (described in Section 4.1.6), coinciding with the planting of the Reservoir and Culvert mitigation areas. The solarization period of the large RCG wetland area in HW-3a will end in Fall 2017, with plastic removal and full planting at that time. With the use of dormant bare root material, all planting dates will depend on plants actually achieving dormancy but are anticipated to be in late October/early November.

4.1.8 Construction Access and Equipment

All access to the area will be via an existing farm field dirt road and parking during construction will be on the road and not within the mitigation site. Work will be scheduled, as much as possible, so that construction activities do not coincide with Farm staff needs for access along the road to its western fields. During periods where motorized equipment is being used, other vehicles carrying workers will not be able to park along the roads and will park adjacent to the western farm fields.

The motorized equipment to be used will include a mower, gas powered weed trimmer, trackhoe, rubber-tired loader, disc or harrow, and a dump truck to haul off excess subsoil from HW-2. A rubber-tired skidder will be used as necessary to move materials. During grading, all equipment except the dump truck, may be used within the site as described in Sections 4.1.3 and 4.1.4, and within the confines outlined by the staked fiber rolls. The dump truck will remain on the gravel access road at all times. Following grading and decompaction, no motorized equipment except the rubber tired skidder (if necessary) will access any portion of the mitigation site.

4.1.9 Post-Construction Maintenance

Irrigation. A drip irrigation system will be established to provide water during the first two growing seasons (longer if monitoring indicates it is necessary) to all trees and shrubs planted outside of the channel floodplain. The drip line will consist of 1/2 inch flexible polyethylene tubing that will be gravity fed from a truck mounted or truck-transported water tank (i.e., a tank brought into the site). A soaker type tubing will be used within the planting areas, but with regular tubing used to connect to the tank to prevent water loss or potential erosion across unplanted slopes. The tank will be placed in the location identified on Figure A-4. Water will be supplied at the rate of 1 inch per week.

The floodplain shrubs will be planted so that they are in contact with the growing season water table and will not be irrigated unless a monitoring visit identifies that the irrigation system needs to be expanded.

Subsequent Weed Control. The RCG is extensive in and adjacent to the HW Restoration area, especially in HW-3a. Once the black plastic is removed and the area fully planted, manual weeding will likely be necessary on an ongoing basis until the planted trees and shrubs are tall enough to at least partially shade out the species.

The twice annual monitoring will identify whether any new RCG establishes or re-emerges, and mark areas in which the RCG needs to be removed. As for all RCG removal, the entire plant will be removed, including all roots and rhizomes, and disposed of at the designated upland disposal site. The full monitoring plan is described in Section 5.0.

4.2 Culvert Enhancement Area

4.2.1 Objectives/Acres

The overall goals are to:

- Restore the previous channel form by removing excess sediment near the culvert associated with the reservoir failure and the non-native species that have established on the sediment, and

- Enhance the existing 0.30 acre riparian area upstream of the riparian through planting native woody species within the floodplain and adjacent low terraces.

4.2.2 Sediment and RCG Removal

Prior to sediment removal, fiber rolls will be placed at the culvert mouth to prevent pushing of sediment into the culvert during removal, and also at the upstream edge of the area from which sediment is to be removed.

The accumulated sediment will be removed from the upstream end of the culvert after the stream dries in 2016 and a joint Army Corps of Engineers Section 404 permit/Idaho streambed alteration permit issued. Removal will occur either by using a trackhoe situated on the existing road or manually. If a trackhoe is used, it will be stationed on the road at all times and not enter the riparian area or any native habitat. All accumulated sediment will be directly placed into a dump truck or other closed container(s) for hauling to the upland disposal site depicted on Figure A-4. The material will be placed with other waste products generated from the distilling operation, but separated so that the soil (and its associated weed seeds) is not inadvertently used where it could result in weed spread. From 2 to 6 inches of sediment will be removed from the 146 square foot area depicted in Appendix B-2. All removal will be supervised by a Wetland Scientist to ensure that only excess sediment is removed, the original channel bed is not disrupted and that no existing riparian shrubs in the area around the culvert are damaged.

The RCG patches occur on the sediment deposits and should be mostly, if not completely, removed by the excess sediment removal. To ensure all of the RCG roots and rhizomes are removed, a Wetland Scientist will examine the former patch and identify any roots or fragments remaining in the soil that will need to be manually removed. As for the sediment, all RCG roots, rhizomes and other vegetative material will be placed in the dump truck and hauled to the designated upland disposal site. The RCG removal will be completed prior to any planting.

The fiber rolls at the culvert will be removed as soon as the sediment and RCG removal have been completed. The rolls will likely be usable again, but will not be used on the restoration project until they have both been inspected for any weed seed or rhizome parts and placed in a hot, dry upland location for at least 180 days. If necessary, the upper fiber roll will be left in place for one winter season to prevent any channel adjustments (i.e., head cutting) due to the slight change in channel bed elevation. The sediment removal will be done after permit issuance and in the fall after the stream dries, but prior to the onset of winter precipitation. There will be less than a cubic yard of fine sediment removed.

4.2.3 Other Site Preparation

Logging by the previous owner resulted in some piling of small branches within the riparian terrace to the northwest of the culvert. The branches are generally 1 to 3 inches in size and are not suitable for providing stream structure either now or in the future, but do have the potential to enter the stream and clog the culvert. These will be manually removed and placed in the dump truck at the same time that the sediment is removed. No stems larger than 8 inches diameter that could provide habitat structure will be removed. No wood will be removed from the stream channel. The location of the previous logging debris removal area is depicted in Appendix B-2. This area coincides with the existing snowberry community.

4.2.4 Planting

Terrace and floodplain planting is proposed only where the existing canopy cover is 25 to 30% or less. Shrub planting will occur all along the channel where suitable soils exist. Within the overall area, there are four floodplain and three terrace surfaces in which canopy shade is less than 25 to 30% and another approximately 100 lineal feet of small (1 to 2 feet wide each side of the channel) adjacent floodplain surface in which soil conditions are suitable for planting (see Appendix B-2).

Red-osier dogwood and speckled alder will be planted in the floodplain and along the channel edge. Cottonwood will be the primary species planted on the low terraces, with scattered meadowsweet. One hundred and fourteen trees and shrubs will be planted to bring the total riparian woody plant density (outside of the small snowberry patch near the culvert) to an equivalent of 435 plants per acre (full density at a 10 by 10 spacing with accounting for the 40 existing trees and saplings). The cottonwood will be relatively evenly distributed on the terraces, with a spacing of 10 to 15 feet. On average, a 5-foot spacing will be used for the alder and dogwood shrubs, and a 2-foot spacing for the meadowsweet. However, the shrubs will be clumped in suitable areas and not evenly spaced. Table 7 summarizes the numbers of plants to be installed by species.

The floodplain soils are relatively shallow and bare root stock will be used if roots are less than 12 inches long. If not, 10 cubic inch tubelings will be planted. All terrace planting will use bare root stock. Section 4.4.4 provides details on planting specifications.

There is an existing perennial dicot and fern understory and, therefore, no additional herbaceous planting or seeding will be necessary.

As for all mitigation areas, anti-herbivory cages will be installed at the time of planting.

Table 7. Number of Plants by Species to be Installed in the Culvert Enhancement Area.						
Planting Surface	**Target Habitat and Map label**	**Alder**	**Dogwood**	**Spirea**	**Cottonwood**	**Total**
Floodplain	Scrub shrub (PSS)	32	42			74
Terrace	Cottonwood Forest (CW)			10	30	40
Total		32	42	10	30	114

4.2.5 Construction Access and Equipment

All access to the area will be via either an existing gravel road from McArthur Lake Road or a seasonally available dirt road through the Highland Flat farm fields (see Figure A-5). Parking during construction will occur along the gravel road adjacent to the site or west of it within an upland area logged by the previous owner. The only motorized equipment to be used will be a trackhoe for sediment removal. The trackhoe will be able to access the culvert area at all times from the gravel road and will not enter the mitigation area or leave the roadway. All other work will be done manually.

4.2.6 Mitigation Area Sequencing

The sediment and RCG removal needs to be conducted under low flow conditions, which typically occur between mid-summer to early fall, prior to re-initiation of substantial streamflow. Planting will occur in late October to early November when the dormant stock is available. The irrigation system will be installed in late March/early April 2017.

4.2.7 Post-Construction Maintenance

Irrigation. A drip irrigation system will be established to provide water during the first two growing seasons (longer if monitoring indicates it is necessary) to all trees and shrubs planted on the low terraces. The drip line will consist of 1/2 inch flexible polyethylene tubing that will be gravity fed from a truck mounted or truck-transported water tank (i.e., a tank brought into the site). A soaker type tubing will be used on the terrace surface, but with regular tubing used to connect to the tank to prevent water loss or potential erosion across unplanted slopes. The tank will be placed in the location identified on Figure A-3. Because of the slope difference, a pressure reducer will be added at the tank. Water will be supplied at the rate of 1 inch per week.

The floodplain shrubs will be planted so that they are in contact with the growing season water table and will not be irrigated unless a monitoring visit identifies that the irrigation system needs to be expanded.

Subsequent Weed Control. It is anticipated that all RCG, including roots and rhizomes, will be removed during the mitigation implementation. However it is possible that new plants could establish as the species occurs both up and downstream.

The twice annual monitoring will identify whether any new RCG establishes. Any observed RCG plants will be immediately removed or marked for Farm staff removal, and will be disposed of at the designated upland disposal site in the "weed disposal portion". The full monitoring plan is described in Section 5.0.

4.3 Reservoir Mitigation Area

4.2.1 Objectives/Acres

The overall goals are to:

- Establish a native wetland plant community along the reservoir where gradual side slopes occur (0.097 acres).

- Remove the non-native RCG as it establishes in these areas.

- Enhance the wildlife value of the reservoir (which is currently being used by migrating waterfowl) by providing wetland food plants and deciduous shrub cover.

4.3.2 RCG Removal

The mitigation area is located on an organic farm and weed control will be through mechanical means. As of April 25, 2016, the RCG was restricted to the Upper Reservoir planting area, but did expand around the reservoir during the 2106 growing season. All RCG will be manually removed in summer 2016 as soon as possible after the reservoir water level drops below an estimated 2,259 feet above MSL. This will allow for work to be conducted in moist soils so that full root systems can be extracted, but without working in standing water. Prior to the manual removal, fiber rolls will be placed between the removal area and the low water pool and staked at 10-foot intervals as also described in Section 4.4.1. Removal will be conducted using spades, shovels or other similar hand digging tools. If soils are saturated at the time of removal, a series of untreated boards will be placed in the area for workers to stand on to limit compaction or other damage to the wetland soil.

During the RCG removal, all roots, rhizomes and vegetative material will be dug up and placed within a secure container (e.g., covered plastic bin), which will then be transported to the upland disposal site noted on Figure A-4. A Wetland Scientist will be on-site during the removal to ensure that all material is removed and that no material is inadvertently placed in an area where resprouting

could occur.

The fiber rolls will be removed once the fall planting has been completed, unless ongoing RCG removal is anticipated. In this case, portions of the fiber rolls may be retained in place until Fall 2017. The rolls will likely be usable again, but will not be used on the restoration project until they have both been inspected for any weed seed or rhizome parts and placed in a hot, dry upland location for at least 180 days.

4.3.3 Other Site Preparation

No other site preparation will be conducted.

4.3.4 Planting

In the Upper Reservoir Planting Area, the reservoir edges within 1 foot of the OHW (approximate elevations of 2,261 to 2,263 feet above MSL, where the upper slope is suitable) will be planted with coyote willow at an "average spacing" of 5 feet (mean density of 1,742 plants per acre, see Table 8). However, the willow will be clumped below the OHW line at a closer spacing within two-thirds of the area, with a Nebraska sedge-Baltic rush wetland sod placed in between the clumps (mean density within the planting area of 1,167 shrubs per acre or 67% of the area times the typical density at a 5 foot spacing [1,742]).

Between elevations of approximately 2,261 and 2,260 feet above MSL, a bulrush sod will be placed. No planting will be done below the estimated 2,260 feet elevation contour where cattail is establishing as it is anticipated that the bulrush will move into the area. Additionally, wetland sod is not recommended for fall planting where it will be inundated by more than 6-12 inches immediately after planting. If necessary to promote native plant cover in the deep marsh area (2 to 3 feet deep at OHW), additional sod or plugs will be placed in late April or early May to coincide with the receding reservoir water level.

Coyote willow will also be planted (without the wetland sod) in the Upper Reservoir planting area (also at 5 foot spacing within 80% of the area), and in scattered microsites along the western reservoir edge. The western reservoir edge microsites will be identified and flagged during the RCG summer removal period to allow examination in relation to the actual reservoir low water level, and are anticipated to occur along approximately one-third of the shoreline. These reservoir fringe plantings will be treated as experimental and, although monitored, will not be subject to meeting the formal success criteria.

Table 8. Number of Plants by Species to be Installed in the Reservoir Mitigation Area.					
Planting Area	**Target Habitat**	**Acres**	**Coyote Willow**	**Sedge-Rush Mat**	**Bulrush Mat**
Upper Reservoir-OHW area (west)	PSS	.008	14		
Upper Reservoir-OHW area(east)	PSS/PEM	.015	18	4	
Upper Reservoir-Deep	PEM	.061			10
Lower Reservoir - OHW area	PSS	.013	18		
Reservoir Fringe-OHW	PSS-experimental	NA	15 to 50		
Total		**.097**	**50 +15 to 50 experimental**	**4**	**10**

Planting will occur in the Fall once the willow stock becomes dormant and soils are saturated where the sod is to be placed. The woody species stock is anticipated to achieve dormancy in mid-October to early November.

The wetland sod installation is very time and moisture sensitive. The sod needs to either be installed immediately upon pick-up, or no later than three days after pick-up. If stored, the sod needs to be kept rolled up, placed in a shady area and kept thoroughly saturated and covered by a tarp during that time. It is anticipated that those storage conditions could be met at the reservoir in the fall.

Moisture conditions necessary for sod installation are:

- Soils in the installation area are saturated, and
- The reservoir is in the process of filling so that the mats can not dry out.

If the Fall 2016 is unseasonably dry and these conditions can not be met throughout the area, sod installation will occur only for those mats placed close to the 2,260 foot contour and the remaining mats will be placed in Spring 2017 as the reservoir water levels recede to allow concurrent plant rooting.

To facilitate an understanding of reservoir water level fluctuations and allow rapid identification of conditions suitable for sod installation, one to two staff gages will be placed within the Reservoir mitigation area. One would be placed near the reservoir outlet adjacent to the lower edge of the

planting area. The second would be placed in the Upper Reservoir Area where bulrush sod is proposed. Gage levels would be recorded weekly by farm staff as planting dates approached to ensure that appropriate hydrologic conditions will be met.

Moving the sod rolls to the reservoir will require a combination of manual labor and use of a rubber-tired skidder.

At the time of installation, the mats will be moved from their temporary storage (if temporary storage is required), or directly from the transport truck to the installation location. They will then be unrolled and carefully placed so that the plant roots and the bottom of the mat are in direct contact with the soil without any space between the mat bottom and ground.

Once placed flush, the mats will be anchored using wooden stakes at a rate of eight to twelve stakes per mat.

Details of bare root planting are the same for all sites and are described in Section 4.4.3.

4.3.5 Construction Access and Equipment

All access will be pedestrian with vehicles parked on the existing roads identified on Figure A-5 and in Appendix B-3, with the exception of moving wetland sod and fiber rolls to the Upper Reservoir area and removing containers filled with RCG and associated sod and rhizomes. For these activities, a rubber tired skidder will be used to transport materials. The skidder will access the Upper Reservoir planting area via the old logging road at the top of the eastern berm and traverse across the vegetated slope to the planting area. The skidder will not be necessary for planting in the other reservoir planting areas and will not be used below the OHW line.

Manual equipment will primarily be used (shovels, spades, hammers), with the only mechanized vehicle being a rubber-tired skidder used to deliver materials exceeding manual transport capabilities over a distance (i.e, greater than 50 lbs and for more than a couple hundred feet) or for which inappropriate transport could damage the material.

4.3.6 Mitigation Area Sequencing

The manual removal of RCG in the Reservoir Mitigation area needs to be conducted under moist soil conditions to have the greatest success in removing all vegetative parts including roots and rhizomes which can be extensive. The plan is to install the fiber rolls for erosion control and manually remove the RCG in mid-summer when the reservoir level has been drawn down but soils are still moist enough to extract the roots. The sod installation and bareroot planting will occur in the Fall 2016, as materials are ready. This is anticipated to be late October or early November for the bare-root stock and in September for the sod.

4.3.7 Post-Construction Maintenance

Irrigation. All plants will be placed so that they are in contact with the growing season water table and no irrigation is anticipated.

Subsequent Weed Control. It is anticipated that all RCG, including roots and rhizomes, will be removed during the mitigation implementation. However, it is possible that new plants could establish as the species is abundant in the upstream reference area.

The twice annual monitoring will identify whether any new RCG establishes. Any observed RCG plants will be will be either immediately removed or marked for Farm staff removal. All RCG plants, including roots and rhizomes, will be disposed of at the designated upland disposal site in the "weed disposal portion". The full monitoring plan is described in Section 5.0.

Other. Anti-herbivory cages will be installed around all woody plants above the OHW at the time of installation. These will be inspected during each monitoring visit to ensure they are functionning to prevent ungulate herbivory and replaced as necessary.

The wetland sod mats will be firmly attached and anchored to the soil according to manufacturers recommendations for reservoirs with fluctuating water levels. Although unlikely, it is possible that a mat could move as the reservoir fills or under heavy precipitation conditions. The Highland Flats Farm staff will examine the planting area at least once per week following installation until snow or ice covered to ensure that the sod remains firmly anchored and saturated.

4.4 Details Common to All Areas

4.4.1 Erosion Control

Nine to 12-inch diameter fiber rolls or weed-free straw wattles will be used for erosion control, except in the HW-2 channel where smaller rolls are necessary to prevent channel restriction. These will installed immediately adjacent to the open water or wetland edge, as described for each individual site or planting area, and staked at 10-foot intervals. Where motorized equipment will be used immediately adjacent to the fiber roll or there is a grade change between the stream channel and the upper slope, the rolls will be stacked to provide an 18 to 24 inch tall barrier to sediment movement. Stakes to be used for anchoring will exceed the roll or stacked roll diameter by a minimum of 9 inches, allowing 6 inches to be inserted into the ground for anchoring with 3 inches of stake exposed on the top.

Table 9. Summary of Locations in Which Erosion Control Will Be Used.			
Mitigation Site	**Location**	**Lineal Feet**	**Duration/Timing of Removal**
HW	HW-2 Channel	300 (150, 2 banks)	Until full planting Fall 2017
	Upper HW-3a Grading edge	130	Removal post grading to allow solarization application or re-application
	HW-3b Tilling edge by channel	150	
Culvert	Immediately above culvert	20	Removal post RCG removal 2016
	Upstream edge of sediment removal	10	Removal fall 2016 or summer 2017 following peak flows
Reservoir	Upper Reservoir area between low pool and RCG removal area	minimum of 120	Post RCG removal 2017

4.4.2 Weed Control

Weed control will occur for all plants listed on the Idaho Noxious weed list and those plants identified as non-native invasive plants. Based on the baseline data, the primary species for which weed control will be necessary are RCG and tansy. Other non-native species are anticipated to be controlled using the same measures described for these two species, but if these measures are not successful, additional weed control measures will be identified as described in the Contingency Plan in Section 5.4.

The mitigation sites are located on an organic farm and weed control will be through mechanical means. Two methods of control will be used:

- Complete plant removal, including roots, rhizomes, leaves and vegetative parts, with disposal in the upland site depicted on Figure A-4. This will occur when the soil is still moist enough for full root removal but after most standing water has evaporated. Removal timing will be critical as removal from dried soils will most likely result in ineffectual weed control and potentially increased growth and sprouting.

- Solarization, which kills the existing plants through heating under a plastic or other shade cloth.

Control via whole plant/patch removal will be used in the Culvert (trackhoe and manual) and Reservoir (manual only) areas. There are two very large tansy plants in the HW-1 area in which substantial anthills have been constructed. These tansies are located more than 10 feet from the channel in vegetated upland areas, allowing for mechanical removal with a trackhoe, or combination of trackhoe and small rubber-tired bulldozer or loader, to remove the nest without any wetland impacts. Manual labor will be used to remove any remaining tansy plants. Select removal of RCG will also be used in HW-2 where equipment can access the channel without compaction of wetland soil or damaging any pre-existing native plants.

Solarization will be used in most of the HW Restoration area. Heavy black plastic material (HDPE sheeting, 6 mil) will be used to cover all areas dominated by RCG.

Mowing will occur prior to the plastic installation in HW-1 and HW-3a, as feasible, to ensure that the material can be placed in close proximity to the soil and trap the necessary heat. There was insufficient weed growth observed in April in segments HW-2 and HW-3b to require mowing prior to other activities and these segments will also be tilled. However, if necessary, mowing will be used prior to any site work. Any other items that might tear the barrier, such as sticks or rocks, will be manually removed, except as described in Section 4.1.4. In some areas a hand-held, gas powered weed trimmer (weedeater or weed whacker) may be necessary to trim herbaceous vegetation around existing shrubs or within the channel. No existing shrubs are to be removed during the mowing. It will be very important to conduct the mowing and trimming prior to any seed set so that the activity doesn't result in increased seed dispersal.

Once the non-native vegetation has been trimmed close to the soil surface, black plastic will be placed over the areas infested by RCG, tansy and other non-native invasive species. In order to provide an additional weed buffer, the plastic will also extend outside the mitigation area to the road edge in Segments HW-2 through HW-3b and either black plastic or wood chips used to cover the pathway in HW-1. Because of the area involved (up to 1.5 acres), multiple plastic sheets will be required. The sheets will be placed so that they overlap by at least 4 to 6 inches to avoid gaps and anchored in place by 6 inch by 1 inch landscape staples (also referred to as metal anchors), at a rate of one every 10 feet along the sheet edges. The edges of the plastic near the dirt road will be covered by 4 inches of wood chips to cover the edges and additionally anchored by medium-sized rock (6 -12 inches) or cement blocks to prevent movement in the wind. Rock or blocks will also be hand-placed selectively within the planting area to keep the sheets in place.

The plastic sheets will be cut around the scattered existing shrubs, shrub patches and small trees to ensure that they will be retained (primarily in HW-1 and portions of HW-2). Four inches of wood chips/shreds will be placed within the openings to prevent weed emergence. The areas around these plants will be periodically examined for the emergence of weeds, with manual removal of any emerging stems as soon as observed. If more than occasional stem emergence is observed, or more stems emerge than can be manually controlled, additional application of wood chips will occur.

The sheets will be examined on a weekly basis during the growing season and after any large storm or wind events to make sure that (1) they remain in place, and (2) any gaps or tears that appear are

quickly covered by additional black plastic and anchored into the soil.

Except for the HW-2 area to be graded, the plastic will remain as is in the HW Restoration area between July and Fall 2017, when full planting will occur.

4.4.3 Best Management Practices

Best management practices (BMPs) to be employed at all times to minimize (1) discharge of sediment to wetlands and waters, and (2) impacts to vegetation or soils are described within the details for each individual mitigation area. These include:

- Installation of fiber rolls or weed-free straw wattles around work areas to prevent siltation into the adjacent channel or wetlands.

- Designation of specific access roads and parking areas to be used during construction for each site.

- Scheduling of grading work during dry periods when soils are not saturated.

- Restriction of equipment to rubber-tired vehicles, as much as possible, when used within a mitigation area.

- Restriction of motorized equipment used within the Culvert Enhancement area to the adjacent gravel road at all times, and the skidder used to transport equipment and materials to the Reservoir Mitigation area above the Reservoir OHW line.

4.4.4 Planting

Planting Material. Most of the planting will use dormant stock. Woody plant materials will consist of either 1-2 year old bare root stock or 10 cubic inch tubelings. Local Boundary or Bonner County nurseries will be used for stock as much as feasible, and if necessary to purchase plant stock outside of these counties, a regional nursery providing cold-adapted Rocky Mountain species will be used.

Herbaceous species will be established through a mix of wetland sod, seed, and potentially plugs. The sod and plugs will be used where saturated soil conditions can be anticipated through at least May. Seed will be used in other areas. Seed mixes will use local or regional stock and will be delivered to the site in the original, unopened bags showing a certified net weight, date of germination tests, supplier's name and certified guarantee of analysis including the composition, purity and germination percentages, and percent/type of weed seed. Seed shall not contain any noxious weed or non-native, invasive species seed. At the time of delivery, the germination test shall be less than nine (9) months old, or as approved by the Wetland Specialist.

The woody species to be used in wetland areas are all native wetland and facultative wetland species that occur on the site. Some facultative upland plants will be used in upland and mesic riparian areas

(i.e., aspen, snowberry). All plants are to be true to name according to the current PLANTS database (NRCS 2016b) or appropriate synonomy. No hybrid species will be used. A list of species to be used is provided within each individual mitigation site section (Sections 4.1 to 4.3), with a compiled list of all woody plants in Appendix C.

The herbaceous layer is dominated by non-native species and locally-adapted species known to compete well with RCG will be used in the seed and sod mixes.

Planting Timing, Delivery and Storage. Woody species planting of the Reservoir and Culvert Mitigation areas and portions of the HW Restoration area will occur in Fall 2016 using dormant stock to ensure greatest survival. Dormancy dates vary from year to year, but dormant stock is anticipated to be available in late October to early November allowing for a late fall planting just prior to the initiation of winter precipitation.

Plants will be delivered directly to the site or picked up from the supplier by the Highland Farms staff, only after all preparations for planting have been completed. Plants will be scheduled for shipping or pick-up so that the plants arrive at the construction site on or the day before the anticipated planting date. Plants will be inspected upon delivery and before planting to make sure that only healthy and vigorous stock is planted and that they exhibit live buds and shoots and that the stems are turgid, firm and resilient to the touch. During planting, only those plants that can be placed in the ground that day will be brought to the field. The remaining plants will be stored on site in a shaded location or in the existing company storage facilities during which time the material will be kept from adverse conditions (freezing, high heat) and kept covered, moist, cool**,** and out of the wind and sun.

Sod will be installed according to the specifications provided in Section 4.3. If additional herbaceous species plugs are necessary to be placed in the Reservoir area, they will be planted during May or June on the receding limb of the seasonal high water table and as the low water table is approached. Non-dormant stock will be used for this planting.

Seeding of most of the HW Restoration area will not occur until 2017. However, because the topsoil in HW-2 will be replaced by a weed-free soil, this area will be seeded in 2016. During seeding, all seed and seed bags will be kept covered, shaded and out of direct sunlight. Seeds will not be stored or temporarily contained in locations or vehicles where the temperature will be in excess of 90^{o}F.

Planting Methods. Bare root stock, plugs and tubelings will be manually planted so that the top of the soil surface of the plug or root crown top on bare root plants will be flush with the existing ground. Holes 10 to 12 inches deep (greater if bareroot stock roots exceed 12 inches) will be prepared with a planting spade or similar tool, with one plant placed immediately in each hole. All stock will be planted upright with roots hanging straight down in the hole, not clumped together, horizontal or curled back upward. The soil around each plant will be tamped down around the plant so that no air spaces remain around the roots. Planting will occur, to the extent possible, in moist or wet soils. If soils are dry at the time of planting, the plants will be watered.

Seed will be broadcast using a small rubber tired tractor mounted seeder or hand broadcast, raked in to a depth of 1/8 to 1/4 inch and covered with a layer of fine mulch, as necessary.

4.4.5 Anti-Herbivory Measures

Woody plants in the HW Restoration and Culvert Enhancement areas will be protected with biodegradable self-supporting, polypropylene mesh cages (also known as Vexar tubes), cut to a minimum 16 inch length and staked into the ground using a minimum of two bamboo stakes per cage.

The woody species browse protectors will need to be examined each monitoring visit to ensure that they are functioning as intended and that the plants are not browsed until they are tall enough to withstand browsing pressure. Browse protectors will be replaced as necessary to protect the woody plants.

5.0 MONITORING PLAN

5.1 Performance Criteria

5.1.1 As-Built 2016

An as-built construction document will be submitted to EPA at the end of construction in 2016. The 2016 as-built plan will include a re-surveyed cross section in HW Restoration segment HW-2 (the only location where grading will occur), along with documentation of construction details, such as copies of sod tags, verification of shrub and tree planting numbers, and implementation photo-documentation. The documentation will be submitted 30 days post construction completion.

A second as-built document will be submitted at the end of all construction in 2017, when the initial RCG solarization control has been completed and all planting has been implemented.

5.1.2 Post Construction

The post construction performance criteria will vary by year and include the following:

Year 1 (2017)

All Mitigation Areas

- Planted woody species in the wetland and/or riparian areas at the sites will achieve at least 80% survival one year after the site is planted. If 80% survival is not achieved, all dead woody plantings are to be replaced, and the 80% performance measure will apply to the new plantings for the following growing season.

Reservoir and Culvert Mitigation Areas

- The wetland sod will maintain the percent cover it had when delivered (specified by the grower to be a minimum of 50%).

- Non-native invasive weeds will provide 10% or less cover.

Year 2 (2018)

Reservoir and Culvert Mitigation Areas

- Native woody species (planted and volunteer) will achieve the following average densities of at least:

    - 435 plants per acre in the wetland and/or riparian areas of the Culvert Enhancement area.

    - 1,393 plants per acre in the planted wetland and/or riparian areas within the Reservoir Mitigation area (equivalent to 80% survival at a planting density of 1,742 plants/acre).

- Native herbaceous plants will cover 33% of the Upper Reservoir area at or below the OHW line.

- Non-native invasive weeds will provide 10% or less cover.

.

HW Mitigation Area

- Planted woody species in the wetland and/or riparian areas at the sites will achieve at least 80% survival one year after the site is planted. If 80% survival is not achieved, all dead woody plantings are to be replaced, and the 80% performance measure will apply to the new plantings for the following growing season.

- Non-native invasive weeds will provide 10% or less cover.

Year 3 (2019)

Reservoir and Culvert Mitigation Areas

- Native woody species (planted and volunteer) will achieve the following average densities of at least:

    - 435 plants per acre in the wetland and/or riparian areas of the Culvert Enhancement area.

    - 1,393 plants per acre in the planted wetland and/or riparian areas within the Reservoir Mitigation area.

- Native herbaceous plants will cover 40% of the Upper Reservoir area at or below the OHW line and be exhibiting signs of vigorous growth and expansion.

- Native plant cover will exhibit a positive trend towards meeting the final Yr 5 cover goals.

- Non-native invasive weeds will provide 25% or less cover.

HW Restoration Area

- Native woody species (planted and volunteer) will achieve the following average densities of at least:

- 612 plants per acre in the mixed PFO/PSS and PSS (equivalent to 80% survival at mean planting density of 765 plants/acre)

- 1,393 plants per acre in the PSS and mesic riparian areas (equivalent to 80% survival at a planting density of 1,742 plants/acre).

- Native plant cover exhibits a positive trend towards meeting the final Yr 5 cover goals.

- Non-native invasive weeds provide 10% or less cover.

Year 4 (2020)

Reservoir and Culvert Mitigation Areas

- There will be no separate Year 4 criteria if all performance criteria are met in Year 3. If not, the Year 3 criteria will apply. A monitoring report with a reduced number of datapoints and/or a change to relevé monitoring along with photopoints is still required. The degree of monitoring necessary in Year 4 to ensure that the vegetation continues to thrive will be determined at the end of Year 3.

HW Restoration Area

- Native woody species (planted and volunteer) will achieve the following average densities of at least:

    - 612 plants per acre in the mixed PFO/PSS and PSS (equivalent to 80% survival at mean planting density of 765 plants/acre)

    - 1,393 plants per acre in the PSS and mesic riparian areas (equivalent to 80% survival at a planting density of 1,742 plants/acre).

- Native plant cover exhibits a positive trend towards meeting the final Yr 5 cover goals.

- Non-native invasive weeds will provide 25% or less cover.

Year 5 (2021)

Reservoir and Culvert Mitigation Areas

- Aerial cover of native species will be at least 80% in the wetland and/or riparian areas of the Reservoir site.

- In the Culvert Enhancement area, the within site cover will be adjusted for the overhanging

canopy and be required to meet a total value of 80%, of which 50% is to be provided by plants within the mitigation area.

- Non-native invasive weeds will provide 25% or less cover.

HW Mitigation Area

- There will be no separate Year 4 criteria if all performance criteria are met in Year 3. If not, the Year 3 criteria will apply. A monitoring report with a reduced number of datapoints and/or a change to relevé monitoring along with photopoints is still required. The degree of monitoring necessary in Year 4 to ensure that the vegetation continues to thrive will be determined at the end of Year 3.

Year 6 (2022)

HW Mitigation Area

- Aerial cover of native species will be at least 75% in the wetland and/or riparian areas of the Reservoir site.

- Non-native invasive weeds will provide 25% or less cover.

5.2 Monitoring Frequency and Reporting

Vegetation monitoring will occur twice annually for the first two growing seasons following mitigation implementation. The first monitoring period will occur once in late April or early May to identify if (1) any overwintering damage occurred or if any growing season remedial actions need to be implemented or if (2) any RCG or other weed species have established and require additional control. Any observed RCG plants will be immediately removed (including all roots and rhizomes) or marked for Farm staff removal, and will be disposed of at the designated upland disposal site in the "weed disposal portion".

The second monitoring period will occur during the peak growing season (late August/early September). An additional mid-summer qualitative monitoring will also occur in Year 1 to ensure that the irrigation application during establishment is sufficient and that all weed control solarization measures are still functionning as desired. If any contingency measures are applied in Year 1, the Year 2 monitoring will also include a supplemental mid-summer qualitative monitoring period.

Ground water monitoring will be initiated during the pre-construction phase to collect data pertinent for the Detailed Plan development. Following restoration implementation the wells will continue to be monitored during the twice annual monitoring periods by a Wetland Specialist, with weekly water levels collected between the beginning of the snow-free season (typically March or April, depending on the actual snowfall) through July and then biweekly to monthly through the rest of the

growing season (end of September) by the Farm staff. The post-restoration ground water data will not be used to evaluate success, as site grades will remain mostly unchanged. Instead the data will be used to identify (1) the nature of any remedial actions necessary if planted species survival appears to be low, and (2) if changes in the temporary irrigation prescriptions need to be made. The ground water data will be included in the annual monitoring reports as background information. The ground water monitoring will occur for at least the first two years post construction, longer if remedial action is implemented, as long as the monitoring can be conducted without damage to the solarization material. Ground water monitoring may need to be temporarily halted for some wells if access for monitoring can not be done without tearing of the solarization material.

Vegetation monitoring will occur twice in Years 3 through 5, with the April monitoring consisting solely of a qualitative review with a single quantitative (plot/transect) monitoring period in late summer.

All monitoring will be by a Wetland Scientist approved by the EPA. A short summary memorandum will be submitted to the EPA within 14 days of completing each spring and late summer monitoring event, providing a brief description of what was observed, whether remedial actions were identified during the monitoring, and identifying the proposed timeline for implementing any remedial actions.
No memorandum will be submitted to the EPA following any interim management type monitoring review, such as reviewing the temporary irrigation system efficiency.

An Annual Monitoring Report will be submitted each year by December 31. Each report will include the following information:

- A description of the conditions within each mitigation area along with a summary of the quantitative vegetation data collected and a comparison of the monitoring results to that year's designated success criteria.

- A description of ground water levels and precipitation amounts and if any unusual weather conditions occurred that affected site conditions.

- Other observations, such as unusual or unexpected herbivory, or other unexpected site factors.

- Summary of any maintenance actions conducted on the site or any contingency measures applied.

- Identification of any deviations from the monitoring protocols prescribed in this Detailed Plan.

- Description of any potential problems observed or any recommended changes to the maintenance or monitoring protocols.

- Photopoint documentation.

5.3 Monitoring Protocols

Monitoring plots and photopoints will be established at a subset of the Detailed Plan transect data collection points in late April/early May 2017. At each data point, percent cover by species, wetland indicator status and native/non-native species status will be collected in nested plots with three 10.7 ft^2 (1.0 m^2) plots along a transect oriented parallel to the data point used for herbaceous species and a larger 10 by 15 foot plot for the shrub/sapling layer and a 10 by 30 foot plot for the tree stratum. In locations where the riparian zones are narrow and the monitoring plots may cross two different planting zones, the woody species plots will be established as a set of contiguous 5 by 15 or 5 by 30 foot plots so that values can be reported according to planting zone. Woody plant density, in the years required, will be sampled in the same plots and reported on a per acre basis. Plant vigor will also be evaluated in each sampling plot and a note made if any damage is observed, such as herbivory in spite of the anti-herbivory measures, insect damage, plant stress (as typically evidenced by early leaf drop, low bud turgor, late emergence) or other.

A minimum of 10 monitoring points will be located in the HW Restoration and adjacent Reference area (8 in the mitigation and 2 in the reference area and a total of 30 herbaceous plots) and four in the Reservoir Mitigation area. Because of the narrower width and small size of the Culvert Enhancement planting areas, the individual planting areas will be used as the plots in which cover values are collected. Woody plant survival and density will be assessed through a full area tally. The total cover value to be achieved will be adjusted to account for the site capability and the effects of the adjacent overhanging canopy to a total of 50% cover from plants within the planting areas and 30% from adjacent surfaces.

Woody species survival in Year 1 will be via a full count in the Reservoir Mitigation and Culvert Enhancement areas, as well as all HW areas planted in 2016. In all other areas, woody species survival will be estimated through subsampling in the established plots.

At least one photopoint will be established in each mitgation area or subarea (i.e., HW-1, HW-2, HW3a, HW3b, Culvert Enhancement area, Upper Reservoir, Lower Reservoir) for a minimum total of 7 photopoints. Photographs will be taken at each monitoring session.

The data will be compiled annually for all parameters, even the parameters addressing subsequent year criteria, to ensure that adequate progress is being made towards meeting all criteria. Parameters for which data will be compiled include:

- Per cent cover by species, per cent cover native and per cent cover non-native, invasive
- Per cent cover by strata (herb, shrub, sapling, tree)
- Plant vigor
- Woody plant survival (First year after all planting, but also evaluated Year 2 when density counts are made)
- Woody Species density where specified (second and third years after planting, but also

evaluated in other years if plant vigor is low or cover not progressing towards the final cover goal).

Where specific performance criteria are to be met in a given year, the data will be used to determine if the criteria are met or not. All other data will be used to track progress towards meeting success criteria in subsequent years.

The monitoring data will be compared to the baseline (pre-construction data), the reference data, and the success criteria using individual mitigation area or sub-area averages where sampling is used and full area tallies where the entire planting area is censused. The comparison to the success criteria will be used to evaluate mitigation success. The other comparisons will be used to evaluate progress and also identify if climatic or other factors are affecting results.

5.4 Contingency Plan

Although all implementation efforts will be conducted in a manner to ensure success, unforeseen items could occur requiring implementation of contingency measures such as (but not necessarily limited to) selective replanting, modification of herbivory measures, or additional weed control. Each monitoring period will be used to evaluate both mitigation success and the need for any intervening measures to correct any deficiencies or other items that could prevent meeting success criteria in subsequent years.

Specific Contingency Plan triggers will include:

- If the planted wood species survival falls below 80% in Year 1, planting back up to a 100% level will be done in the first appropriate planting period (anticipated to be late October/early November 2017), with specific factors affecting planting success identified and corrected. Ungulate herbivory, in particular, can be very strong on deciduous plantings, and even though individual plants will be caged, it is possible that damage could still occur. If this happens, it will be noted during the survival tally and anti-herbivory measures will be strengthened.

- If cover, growth or vigor of plants seems to be lower than expected or not proceeding towards meeting the final cover requirement, the factors affecting the lower vigor will be identified and measures implemented to correct, which may include changes in irrigation, supplemental planting or seeding, or other. Because plants can emerge from seed over a 2-year period, and woody plants initially put more effort into root than top growth, the results of the Year 2 monitoring will be more important than the Year 1 monitoring in evaluating cover progress.

- The weed control plan uses all manual/mechanical control methods and no herbicide control. Solarization and manual removal of RCG and tansy are proven control methods, but take longer, are labor-intensive and may require some adjustments (expansion of solarization area, change in solarization material) during the monitoring period. If in any year, weed

control does not meet the success criteria, additional mechanical control will be added and/or the feasibility of other control methods examined.

- The original deep marsh planting will use wetland sod around the edges of the marsh, with an expectation that once established, additional bulrush or other deep marsh species will expand throughout the full marsh. If this does not occur, additional planting of plugs during the spring as reservoir levels fall may be necessary.

As described in Section 5.2, the need to implement any contingency measure will be described in the immediate post-monitoring memorandum, with a full discussion of any contingency measure implementation in the Annual Monitoring Report.

6.0 SCHEDULE

6.1 Overview

This section provides a comprehensive schedule that includes all mitigation tasks, document submissions and monitoring activities. For some items, the exact date is known (e.g., this plan initial submission on June 15). For activities dependent on plant phenology or soil moisture conditions, such as planting, a general time frame is provided. Key factors affecting mitigation timing include the following:

- Weed control is a major mitigation component and must be timing appropriately.

- Both RCG and tansy are difficult to control and for solarization to be effective, it is best installed so that it is in place continually throughout the growing season, particularly during the hottest months (July and August).

- Manual RCG removal needs to occur when the soil is still moist enough for full root extraction, but after most standing water has evaporated. Removal timing will be critical as attempted removal from dried soils will most likely result in ineffectual weed control and potentially increased growth and sprouting.

- Site preparation activities need to occur on dry, and not saturated soils, to prevent soil damage. The most appropriate time period generally extends from July through September.

- Dormant plants need to be planted after actually achieving dormancy, and the timing of this varies annually.

- Wetland sod needs to be planted at a time when the reservoir is beginning to fill and the mat has achieved a suitable condition for planting, as identified by the manufacturer.

These aspects as well as regulatory constraints were used in developing the comprehensive schedule. All activities are contingent upon a signed Administrative Order on Consent, and some activities are also dependent on the issuance of a Section 404 Nationwide Permit.

6.2 Regulatory Schedule and Constraints

The Highland Flats Farm Conceptual Plan was submitted to the EPA on March 1, 2016 (see also Table 10). A revised Conceptual Plan substituting mitigation around the reservoir for work proposed elsewhere was verbally accepted on May 18 and a revised Plan submitted on May 26, 2016. The Detailed Plan provides additional data necessary for mitigation implementation and was submitted to EPA on June 15, 2016. The EPA reviewed the Plan and sent out a Request for Additional Information on June 30, 2016. The Response to the RAI was submitted to EPA on July 20, 2016, with the requested information to be incorporated into this Final Detailed Plan

An application for a joint Army Corps of Engineers Section 404 permit/Idaho streambed alteration permit was also submitted on July 20, 2016. The joint permit application addressed both the previous Reservoir construction and the proposed mitigation implementation activities that require grading, tilling, mowing or any other soil disturbance in wetlands or other waters, including the unnamed stream channel. Some mitigation work, such as weed control solarization and work in upland riparian areas, can proceed in advance of the permit issuance. The Idaho Department of Water Resources confirmed on September 8, 2016 that no streambed alteration permit was required for the project. The Section 404 permit was signed on September 27, 2016 and issued on September 28, 2016. The date of permit issuance made it necessary to (1) amend the initial schedule in this Final Detailed Plan, and (2) identify that the completion of all Fall 2016 wetland grading and soil preparation tasks will be weather-dependent.

Table 10. Regulatory and Document Submission Schedule.

Task	**Completed or Anticipated Date**
Conceptual Plan	March 1, 2016
Conceptual Plan Revision	May 18, 2016
Detailed Plan Submission	June 15, 2016
RAI from EPA	June 30, 2016
404/ID Permit Application	July 20, 2016
RAI Response	July 20, 2016
404/ID Permit Approval	September 8, 2016 (ID) and September 28, 2016 (404)
Revised Final Detailed Plan Submission	October 2016
2016 Post Construction Monitor Report	30 days post-construction completion, estimated as December 14, 2016
2017 Monitoring Memoranda	14 days post monitor in May and Sept, 2017
2017 Combination Post Construction and Annual Monitoring Report	December 31, 2017
2018 to 2022 Monitoring Memoranda	14 days post monitor in May and Sept of each year
2018 to 2022 Annual Monitoring Reports	December 31 each year

6.3 Mitigation Implementation Schedule

The timing of permit issuance was unknown at the time of the initial Detailed Plan submission, but was originally anticipated to occur in the summer. The schedule provided in this Final Plan is based on the actual late September permit issuance date (Table 11).

Regardless of the permit issuance date, some mitigation implementation tasks were able to begin immediately upon the June Detailed Plan submission, such as bare root plant, sod, and erosion and weed control material ordering. Weed control in upland areas also began in July, as well as wetland weed control measures not requiring permit approval. Wetland weed control activities requiring permit or other approval, such as mowing, were initiated as soon as the Section 404 permit or other approval was obtained.

The timing at which the non-dormant sod is ready for planting and the bare root plants enter dormancy will not coincide. As a result, every effort will be made to coordinate the Fall site preparation with the sod installation in September.

The HW restoration area grading will be initiated as soon as possible following permit issuance. Because the permit was not issued until the end of September, grading will be scheduled for October, a month in which variable weather occurs and in which the Fall rainy season is typically initiated. As specified in the Best Management Practices (section 4.4.3), no grading can occur on saturated soils. If saturated soil conditions occur to the extent that grading would result in soil damage, compaction or other issues that could affect the restoration success, these conditions will be documented by a Professional Wetland Scientist and the grading will be re-scheduled to the first appropriate time period.

Planting will occur in the Fall as stock becomes ready. Planting dates are estimated as occurring between mid October to mid November, but will be dependent on the ability of the dormant stock to be used to actually achieve dormancy. In 2016, dormancy for most of the plants will not likely be achieved until early November (C. Tuttle, Clifty View Nursery, pers. comm). The Culvert and Reservoir areas will be planted in Fall 2016, along with select HW areas. The remainder of the HW area will be planted in Fall 2017 (see Table 12).

Mitigation monitoring will be initiated in 2016 with construction oversight and documentation and be continued for 5-years post construction (or 2021 for the Culvert and Reservoir mitigation areas and 2022 for the HW Restoration area). Contingency Plan implementation will occur as needed. Any need for contingency measures will be documented in the individual memoranda (submitted twice yearly) and the Annual Monitoring Report.

Table 11. Schedule for 2016 Mitigation Implementation. Except for deliverable dates, all dates are approximate and weather or site condition-dependent.[1]	
Task	**Anticipated Dates**
1. Order Materials/Initial Mobilize	Begin June 15
2a. Weed Control-HW Restoration Area	
Remove upland rocks, chips, tansy etc.	Early to Mid-July
Mow or weed trim in upland areas	Early to Mid-July
Mow or weed trim in wetland areas	Early-August
Install black plastic	Early to Mid-July and August
2b. Weed Control Culvert Enhancement	
Manually remove RCG	Mid-Sept
2c. Weed Control-Reservoir Mitigation Area	
Install erosion control and manually dig and remove RCG	Early to Mid-July
3. Site Preparation-Grading and Decompaction-HW Restoration Area	
Remove black plastic, select areas	Mid-Sept
Install erosion control	Mid-Oct
Strip topsoil HW-2 and upper HW-3a	Mid-Oct[2]
Grade HW-2 and upper HW-3a and decompact subsoil	Mid-Oct[2]
Apply clean topsoil HW-2 and upper HW-3a	Mid-Oct[2]
Remove fiber rolls HW-3a	Mid-Oct
Seed graded area	Mid-Oct to Mid-Nov[3]
4. Planting	
Install sod-Reservoir	Mid-Sept

Table 11. (continued)	
Install bare root woody plants-Culvert, Reservoir	Mid-Oct to Mid-Nov
Install bare root woody plants- HW-2, upper HW-3a	Mid-Oct to Mid-Nov[3]
5. Monitoring	
Install staff gage, if necessary	Mid-July
Monitor implementation #1	Mid-July
Monitor implementation #2	Mid-Sept
Monitor implementation #3	Mid-Oct to Mid-Nov
Construction Implementation Report	Mid-Nov to Mid-Dec

[1] Conditions to be considered include plant phenology (RCG cut prior to seed set, RCG roots removed prior to expansion and while in moist soil in Reservoir, dormant stock achieving dormancy), and soil moisture and water tables appropriate for activity (manual RCG removal in moist soils; grading not in saturated conditions, with dry soils preferred; planting requiring moist soils and dry soils not acceptable; reservoir water level appropriate to maintain sod).
[2] These tasks are highly weather-dependent and cannot be conducted on saturated soils.
[3] The HW seeding and planting timing is dependent upon grading completion.

Table 12. 2017 Mitigation Implementation and Monitoring Schedule. Except for deliverable dates, all dates are approximate and weather or site condition-dependent.												
Task	**Month**											
	J	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Maintenance												
Install irrigation-Culvert and HW			X									
Run Irrigation				X	X	X	X	X	X			
Weed Control				X	X	X	X	X	X	X		
Implement Contingency				As, or if, necessary								
Monitoring												
Spring					X							
Mid-Summer						if nec.						
Late Summer								X				
Final Planting and Seeding										X	X	
Memo submission					X				X			
Annual Report												X
2017 Construction												
Install sod, if Fall 2016 too dry					X							
Verify Fall 2017 plant materials					X							
Order any new replacement plants					X							
Remove Culvert fiber roll								X				
Remove black plastic										X		

Table 12. (continued).												
Task	**Month**											
	J	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
2017 Construction (continued)												
Plant HW-1, Lower HW-3a, HW-3b, full channel										X	X	
Replace plants as necessary										X	X	
Seed all HW areas										X	X	
Remove HW fiber rolls											X	

7.0 REFERENCES

EcoWest Consulting, Inc. 2016. Highland Flats Tree Farm Conceptual Wetland and Riparian Restoration Plan . Unpublished and confidential report prepared for Essential Oil Research Farm, LLC, Naples, Idaho.

EPA. 2016. January 26, 2016 E-mail from C. Bellovary to G. Goldberg and A. Peck Re: CWA 404.

FWS. 2016. National Wetland Inventory Maps-Wetland Mapper. http://www.fws.gov/wetlands/Wetlands-Mapper.html.

Google Earth. 2016. http://www.googleearth.com.

Lichvar, R.W., M. Butterwick, N.C. Melvin, and W.N. Kirchner. 2014. The National Wetland Plant List: 2014 Update of Wetland Ratings. Phytoneuron 2014-41: 1-42.

NOAA. 2016. http://www.weather.gov/climate/getclimate.php

NRCS. 2005. ID601-Soil Survey of Boundary County Area, Idaho. Available at http://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/idaho/ID601/0/PartI.pdf

NRCS. 2008. Installing Monitoring Wells in Soils. National Soil Survey Center, Lincoln, Nebraska.

NRCS. 2016a. Web Soil Survey. http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

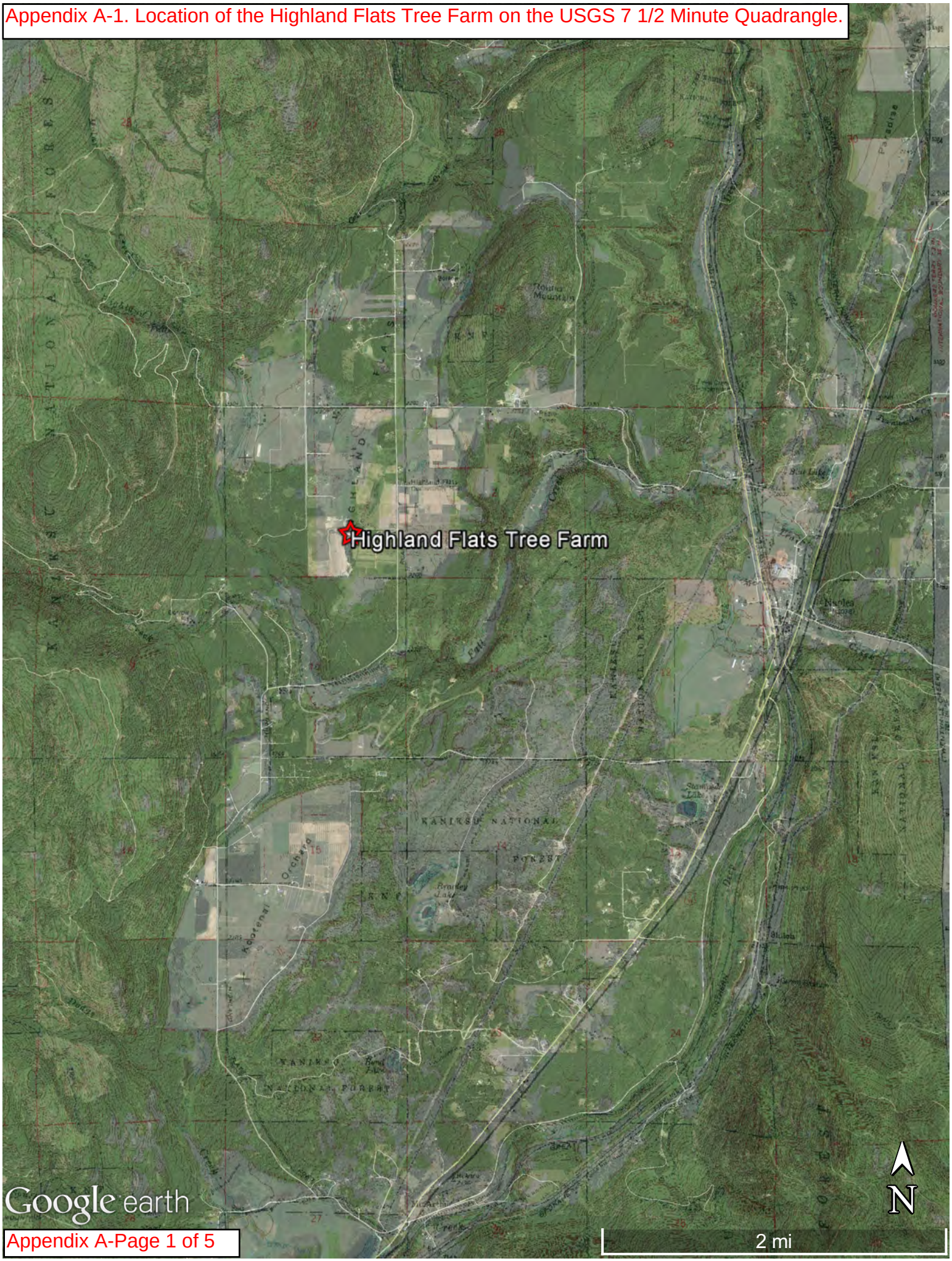
NRCS. 2016b. USDA PLANTS database. Available at http://plants.usda.gov/java/.

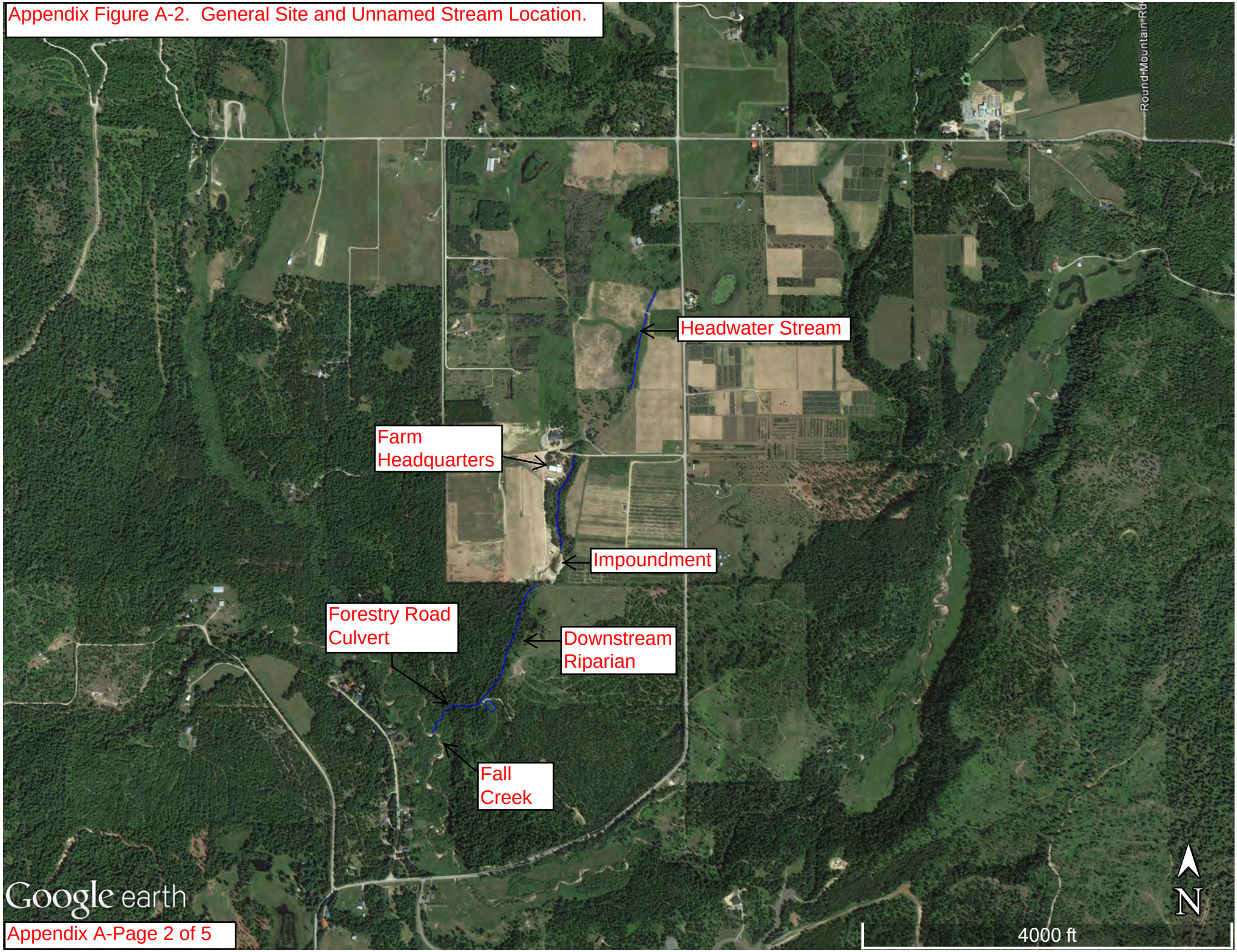
NOAA. 2016. Bonner's Ferry Climatic Data, WETS Tables. Available at http://agacis.rcc-acis.org/16021/wets/results

Oregon State University, PRISM Climate Group. 2016. Available at http://prism.oregonstate.edu.

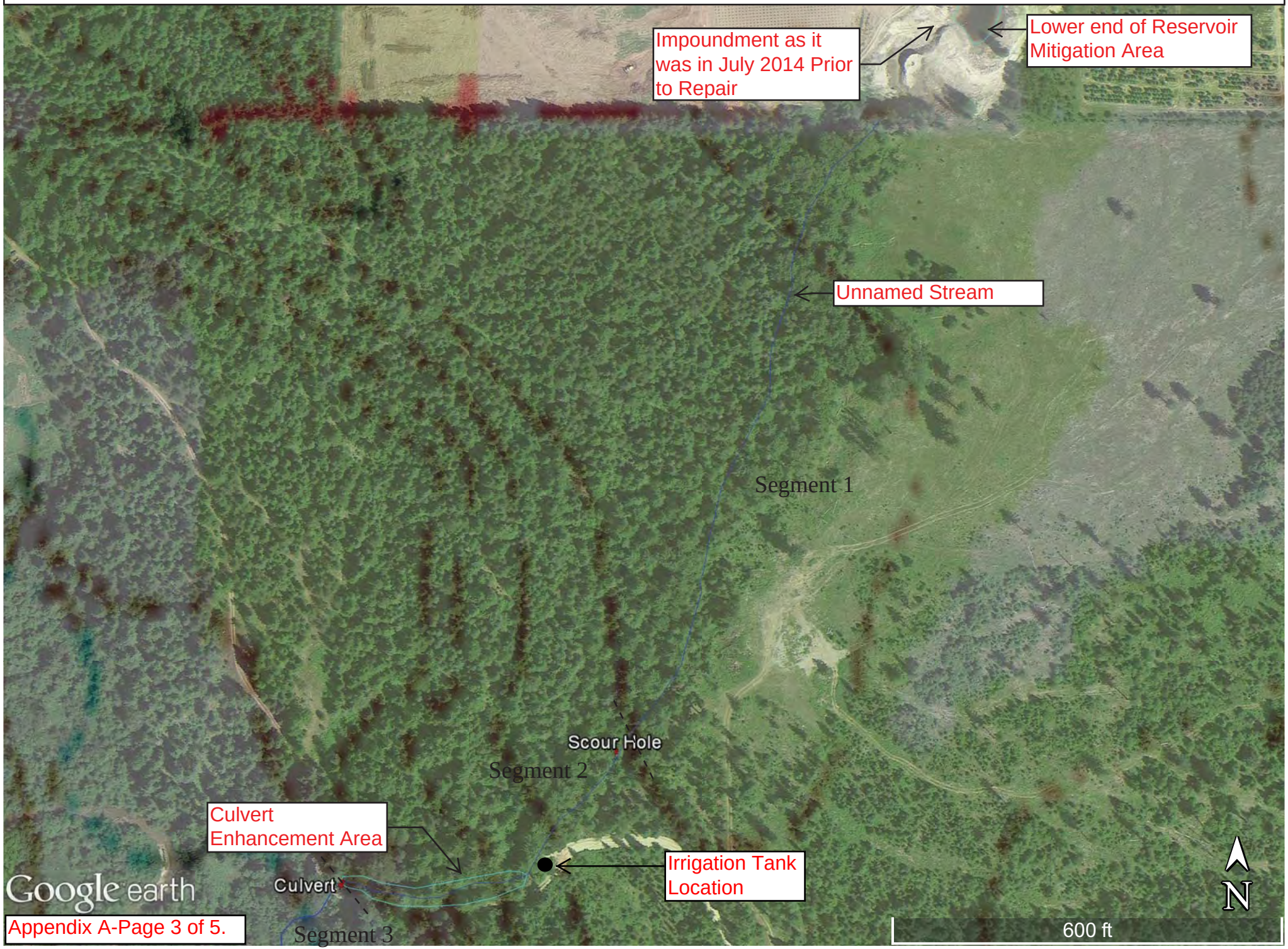
APPENDIX A-SITE AND MITIGATION AREA LOCATION

Appendix A-1. Location of the Highland Flats Tree Farm on the USGS 7 1/2 Minute Quadrangle.



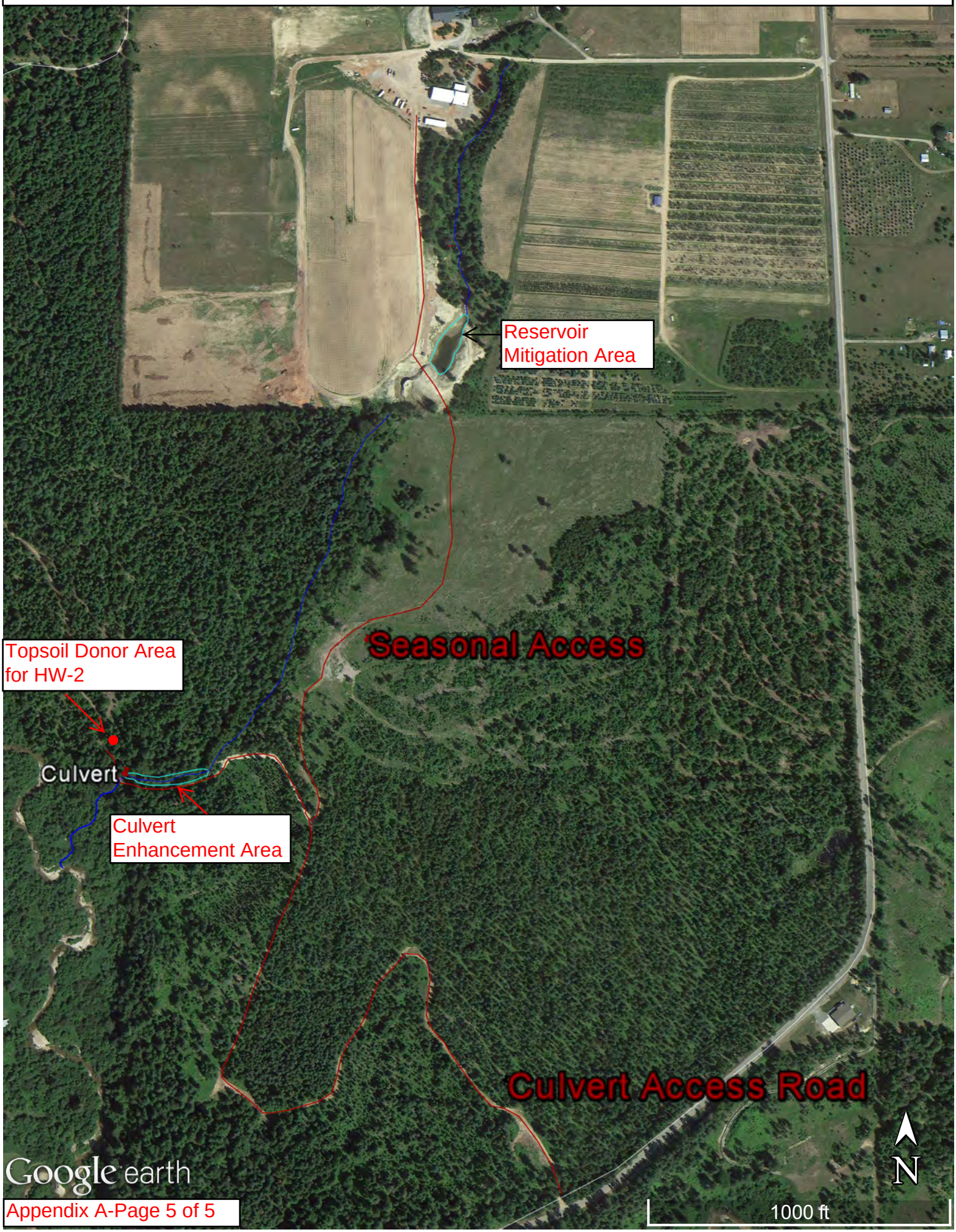

Appendix Figure A-2. General Site and Unnamed Stream Location.
Round Mountain Rd
Headwater Stream
Farm Headquarters
Impoundment
Forestry Road Culvert
Downstream Riparian
Fall Creek
Google earth
N
4000 ft

Appendix Figure A-3. Unnamed Stream Downstream Riparian and General Location of Associated Mitigation Areas and Features.



Appendix Figure A-4. Unnamed Stream Headwater (HW) Riparian and General Location of Associated Mitigation Areas and Features.

Appendix Figure A-5. Access Roads for the Culvert Enhancement Area.



APPENDIX B-DETAILED PLAN MAPS

Appendix B-1. HW Restoration Area Details and Site Topography.

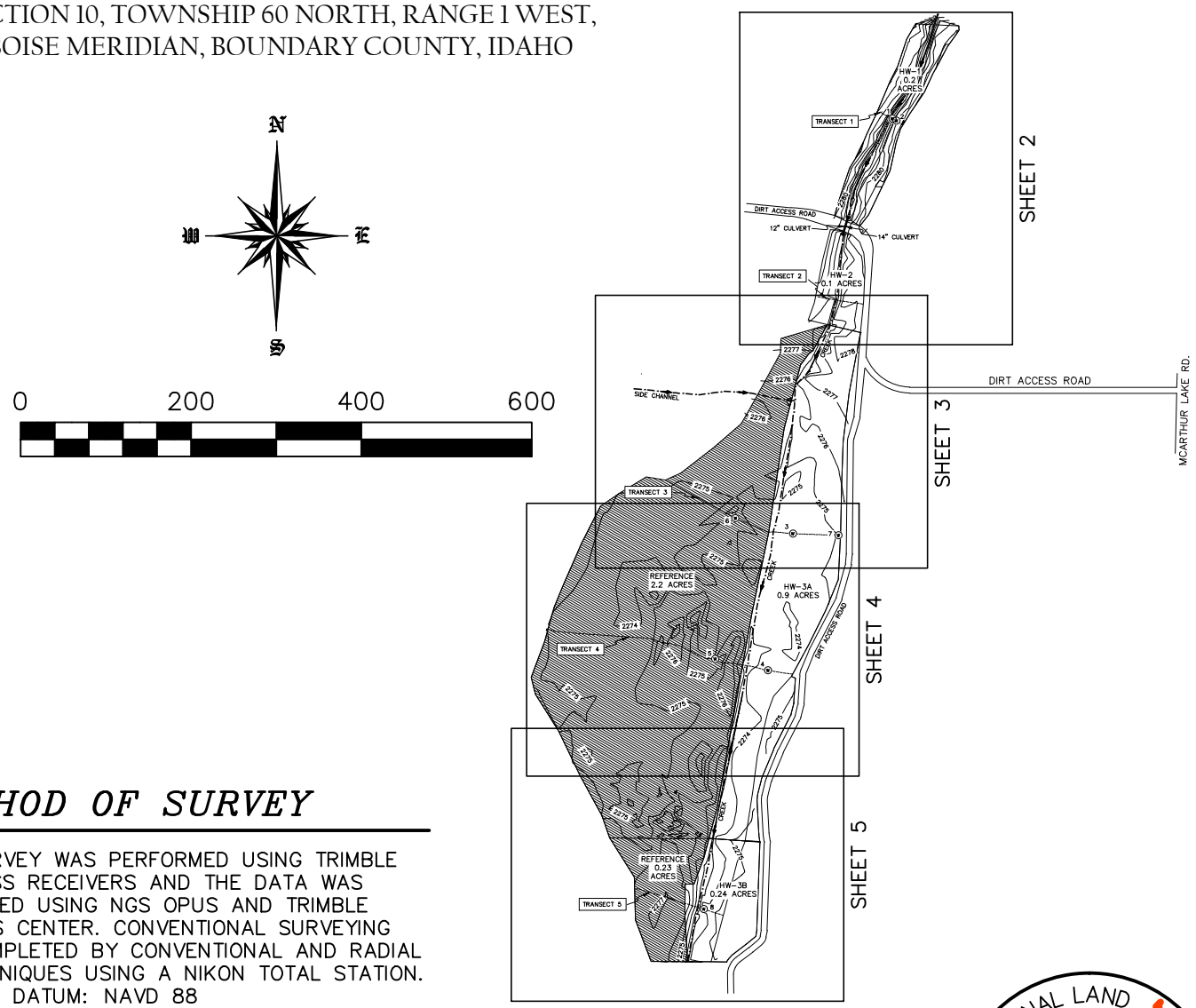
TOPO EXHIBIT MAP

FOR

ESSENTIAL BOTANICLE FARMS

LYING IN A PORTION OF SECTION 3 AND A PORTION OF SECTION 10, TOWNSHIP 60 NORTH, RANGE 1 WEST, BOISE MERIDIAN, BOUNDARY COUNTY, IDAHO

HEADWATER RESTORATION AREA



METHOD OF SURVEY

THIS SURVEY WAS PERFORMED USING TRIMBLE R10, GNSS RECEIVERS AND THE DATA WAS PROCESSED USING NGS OPUS AND TRIMBLE BUSINESS CENTER. CONVENTIONAL SURVEYING WAS COMPLETED BY CONVENTIONAL AND RADIAL TIE TECHNIQUES USING A NIKON TOTAL STATION. VERTICAL DATUM: NAVD 88

SURVEYOR'S CERTIFICATE:

I, TYSON L.A. GLAHE, P.L.S. 14879, STATE OF IDAHO, DO HEREBY CERTIFY THAT THIS TOPOGRAPHIC SURVEY HAS BEEN PREPARED BY ME OR UNDER MY DIRECTION AND THAT THE MAP SHOWN HEREON IS A TRUE REPRESENTATION OF A SURVEY MADE BY ME DURING MAY, 2016.

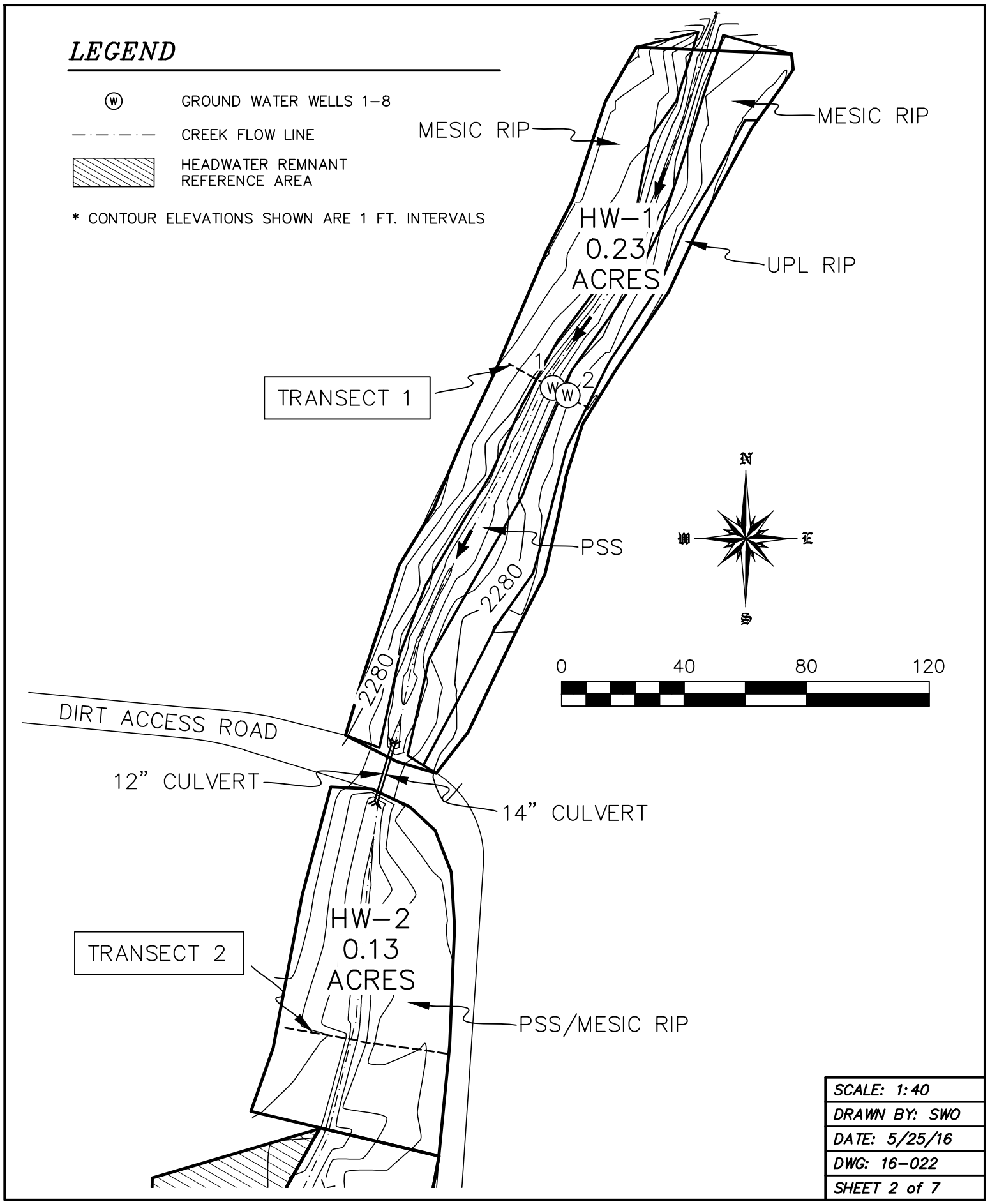
PROFESSIONAL LAND SURVEYOR
LICENSED
14879
STATE OF IDAHO
TYSON L. A. GLAHE
PRELIMINARY

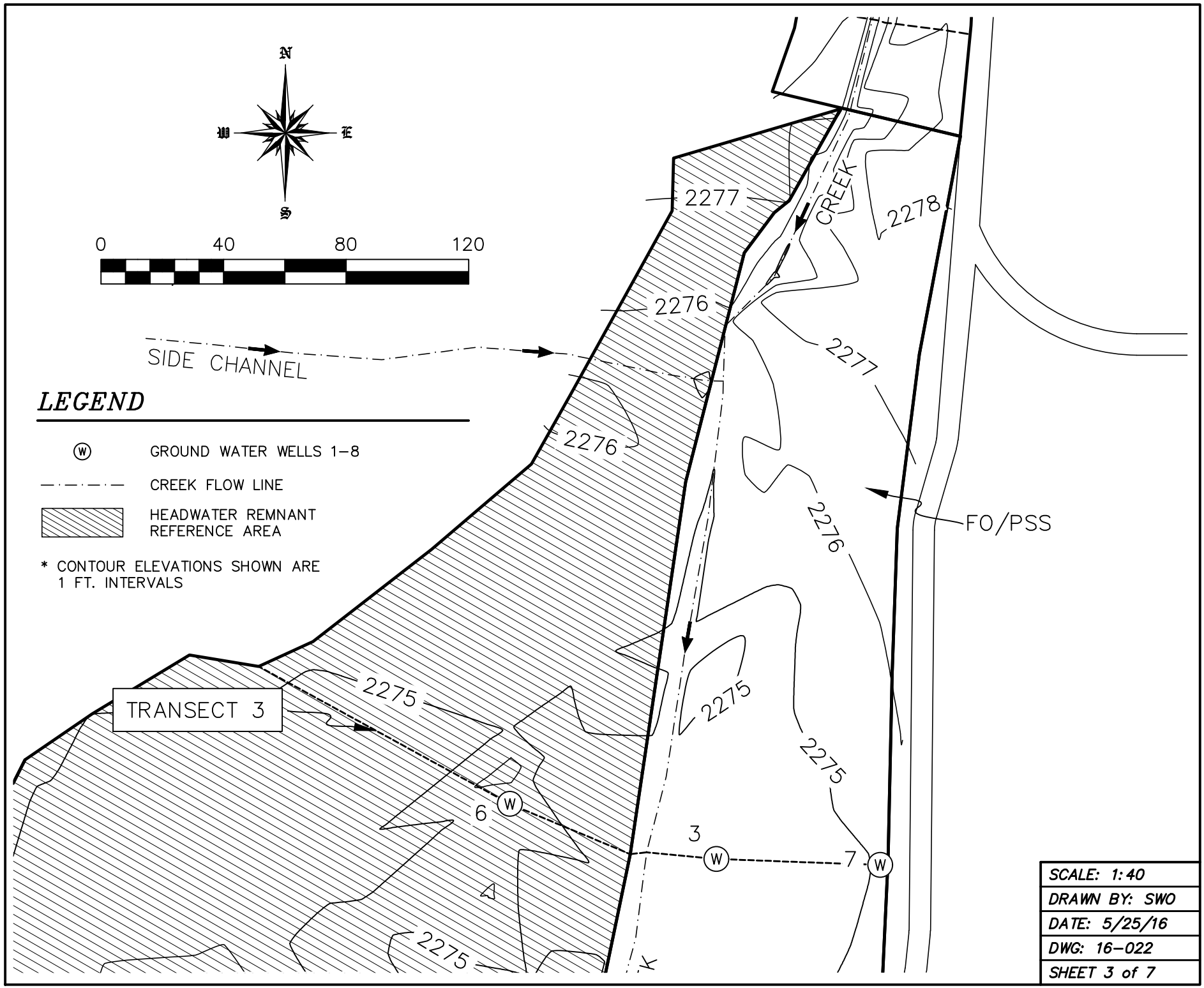
NOTE:

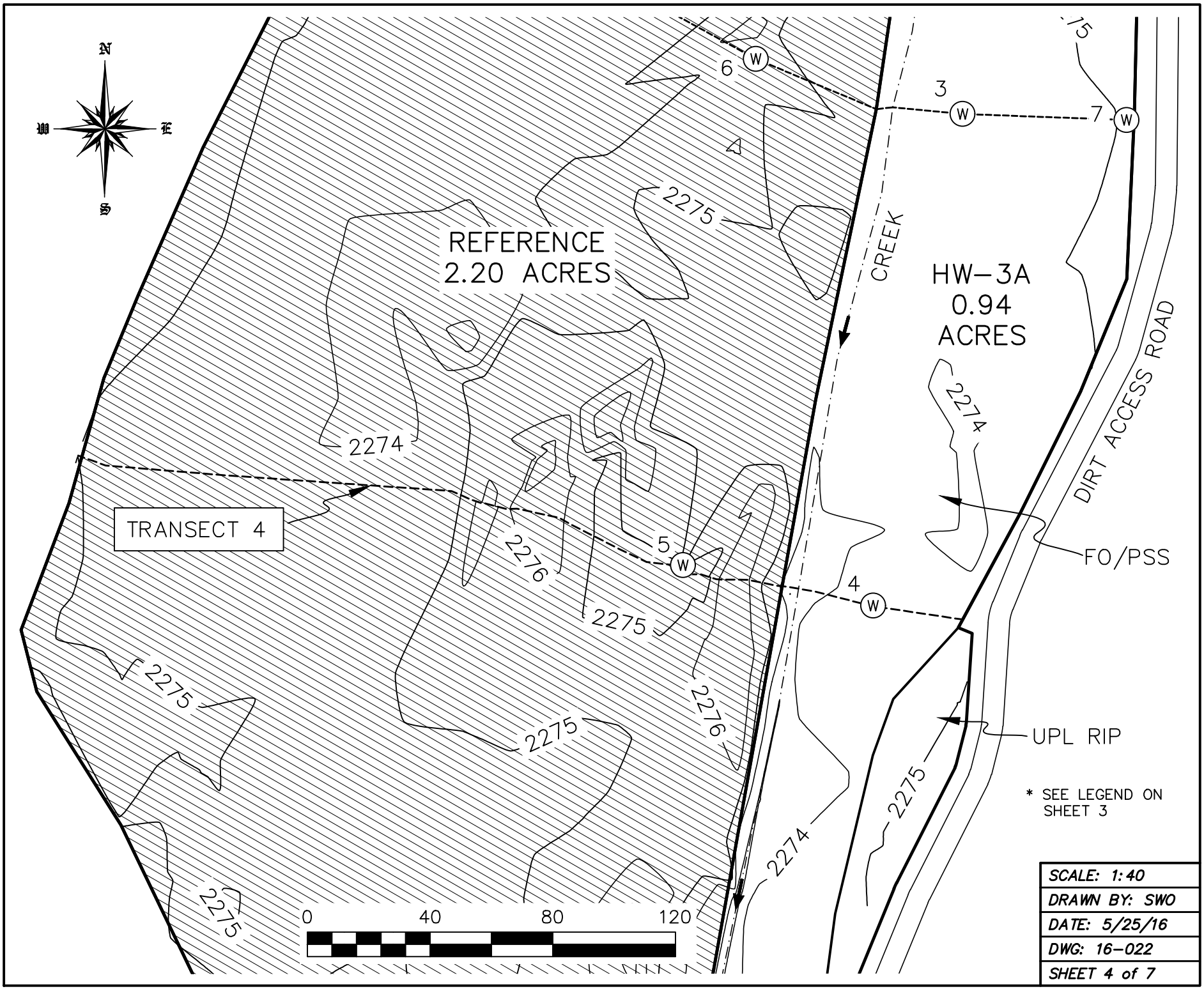
THIS SURVEY MAKES NO REPRESENTATION OF OWNERSHIP, NOR ATTEMPTS TO SHOW ALL EASEMENTS OF RECORD OR IN VIEW, NOR PHYSICAL FEATURES AND IMPROVEMENTS OF THE PROPERTY.

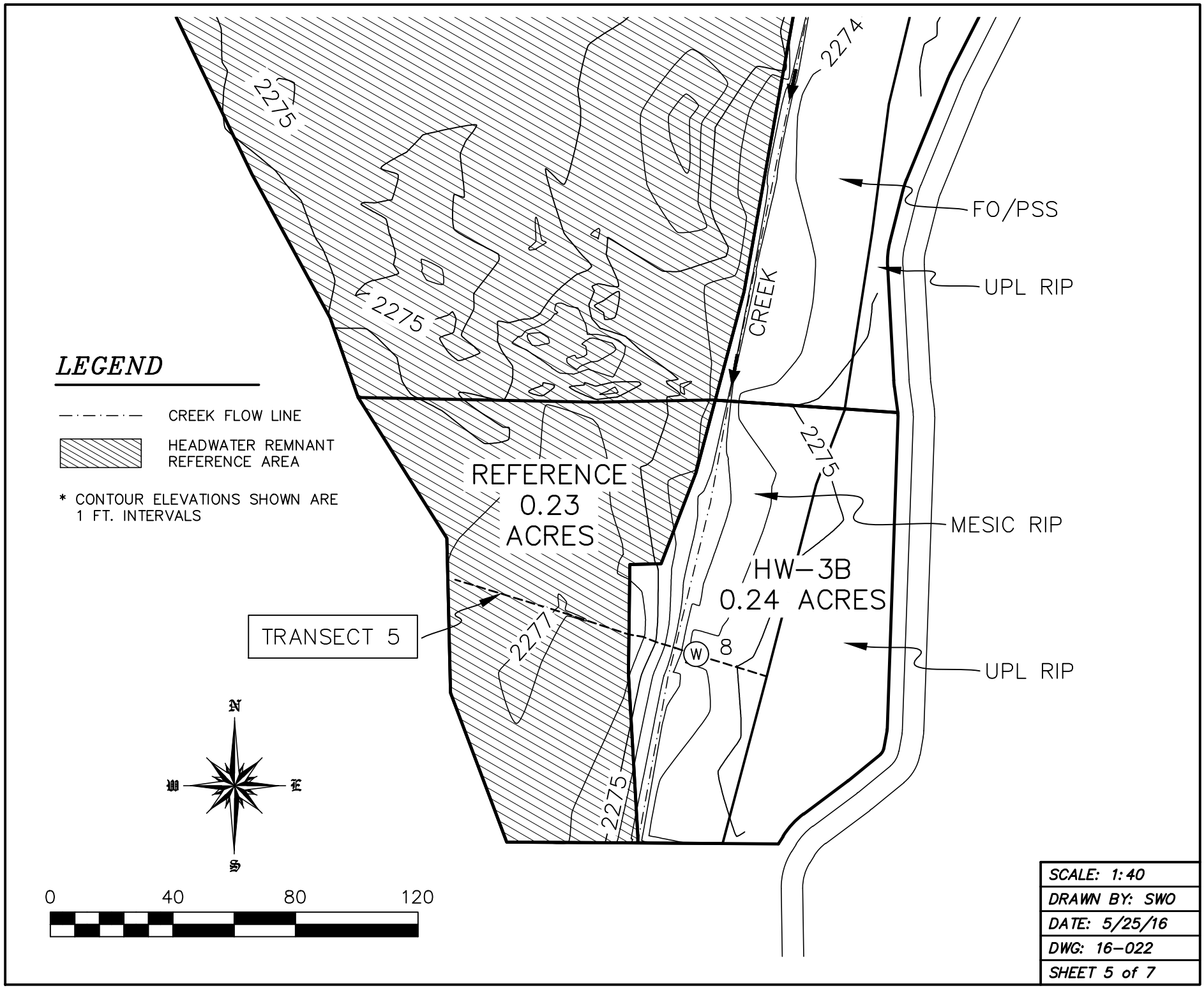
GLAHE & ASSOCIATES
PROFESSIONAL LAND SURVEYORS
P.O. Box 1863
Sandpoint, ID 83864
208-265-4474

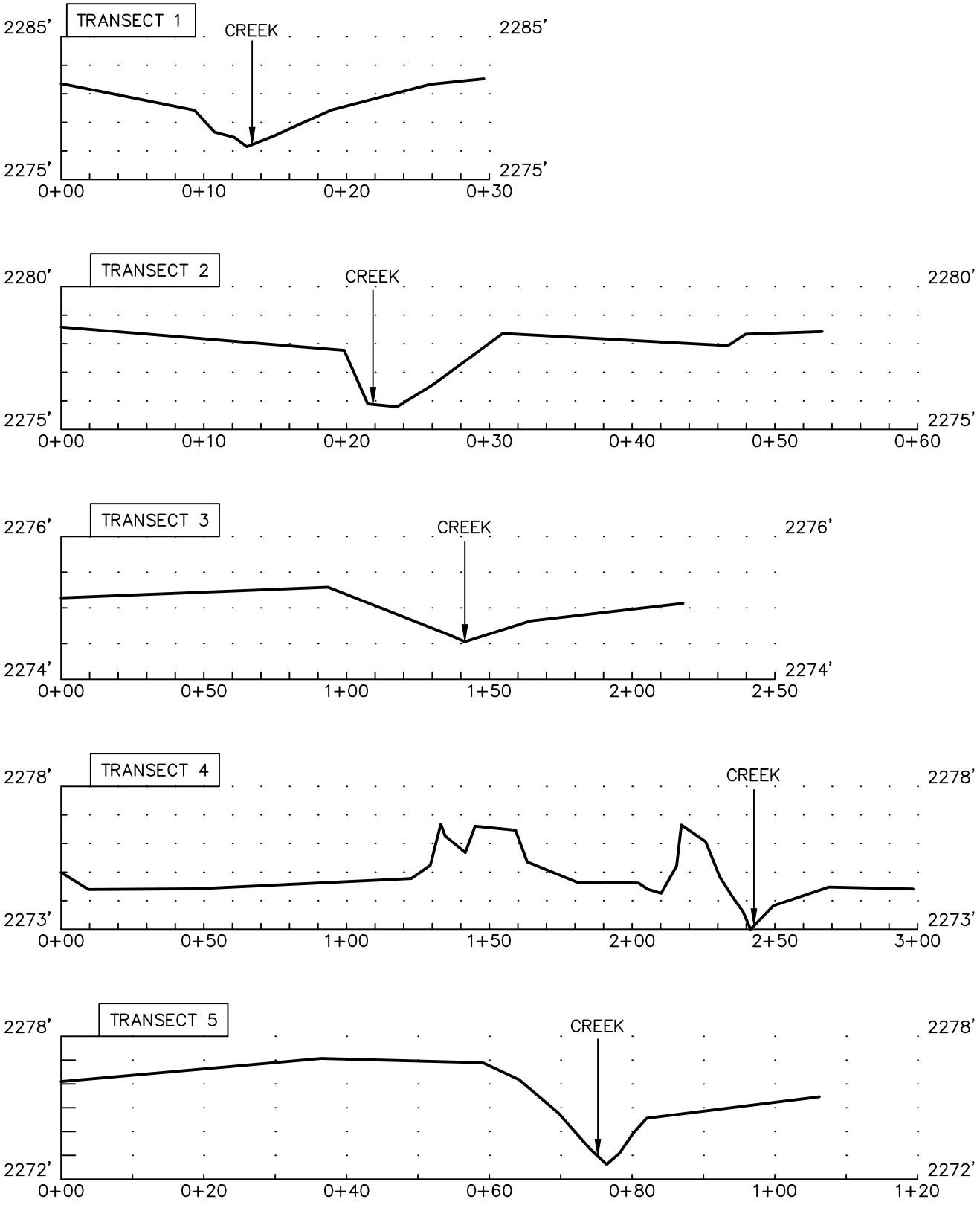
SCALE: 1:200
DRAWN BY: SWO
DATE: 5/25/16
DWG: 16-022
SHEET 1 of 7


LEGEND
GROUND WATER WELLS 1–8
CREEK FLOW LINE
HEADWATER REMNANT REFERENCE AREA
* CONTOUR ELEVATIONS SHOWN ARE 1 FT. INTERVALS
MESIC RIP
MESIC RIP
HW–1
0.23
ACRES
UPL RIP
TRANSECT 1
1
2
PSS
2280
2280
N
W
E
S
0
40
80
120
DIRT ACCESS ROAD
12" CULVERT
14" CULVERT
HW–2
0.13
ACRES
TRANSECT 2
PSS/MESIC RIP
SCALE: 1:40
DRAWN BY: SWO
DATE: 5/25/16
DWG: 16–022
SHEET 2 of 7

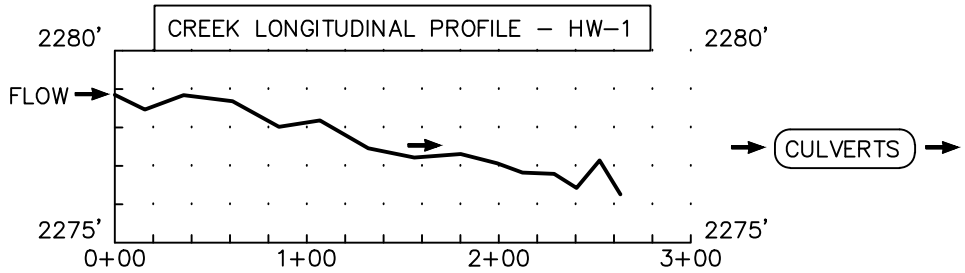

N
W
E
S
0
40
80
120
SIDE CHANNEL
CREEK
2277
2278
2276
2277
2276
2276
FO/PSS
2275
2275
2275
2275
TRANSECT 3
6
3
7
W
W
W
A
A'
LEGEND
GROUND WATER WELLS 1–8
CREEK FLOW LINE
HEADWATER REMNANT REFERENCE AREA
* CONTOUR ELEVATIONS SHOWN ARE 1 FT. INTERVALS
SCALE: 1:40
DRAWN BY: SWO
DATE: 5/25/16
DWG: 16–022
SHEET 3 of 7

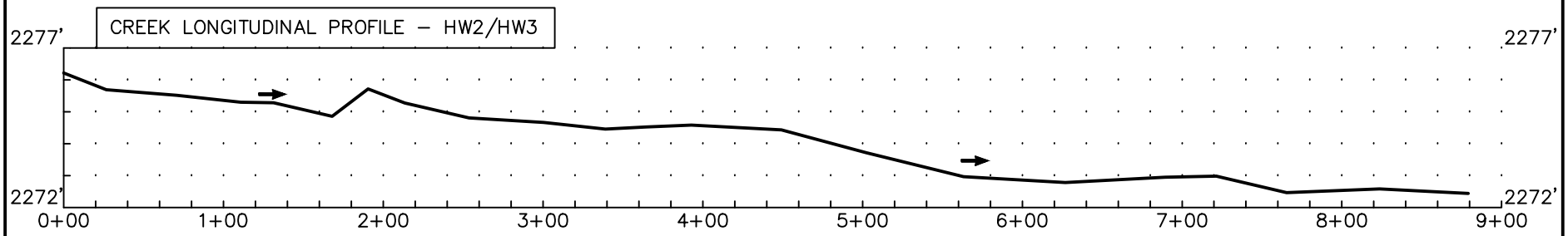

N
W
E
S
REFERENCE
2.20 ACRES
HW–3A
0.94
ACRES
CREEK
DIRT ACCESS ROAD
TRANSECT 4
2274
2275
2276
FO/PSS
UPL RIP
* SEE LEGEND ON SHEET 3
0
40
80
120
SCALE: 1:40
DRAWN BY: SWO
DATE: 5/25/16
DWG: 16–022
SHEET 4 of 7

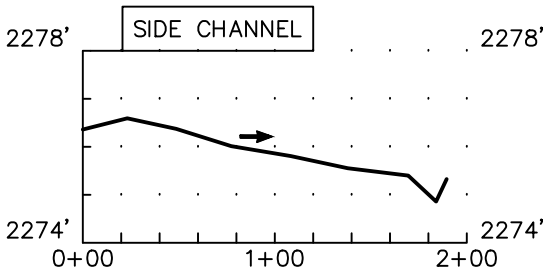

2275
2274
2275
CREEK
FO/PSS
UPL RIP
2275
REFERENCE
0.23
ACRES
MESIC RIP
HW-3B
0.24 ACRES
TRANSECT 5
2271
W
8
UPL RIP
2275
LEGEND
CREEK FLOW LINE
HEADWATER REMNANT
REFERENCE AREA
* CONTOUR ELEVATIONS SHOWN ARE
1 FT. INTERVALS
N
W
E
S
0
40
80
120
SCALE: 1:40
DRAWN BY: SWO
DATE: 5/25/16
DWG: 16-022
SHEET 5 of 7



SCALE: N/A
DRAWN BY: SWO
DATE: 5/25/16
DWG: 16-022
SHEET 6 of 7







SCALE: N/A
DRAWN BY: SWO
DATE: 5/25/16
DWG: 16–022
SHEET 7 of 7

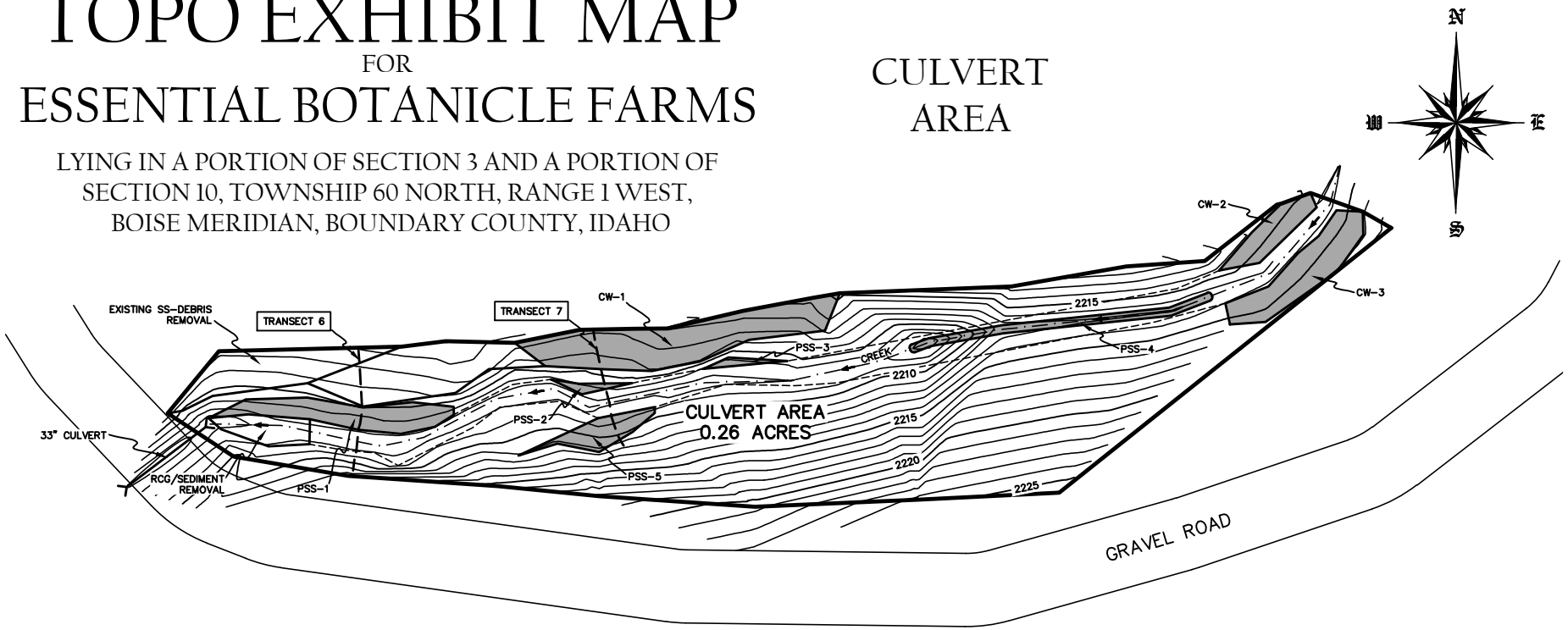
TOPO EXHIBIT MAP

FOR

ESSENTIAL BOTANICLE FARMS

LYING IN A PORTION OF SECTION 3 AND A PORTION OF SECTION 10, TOWNSHIP 60 NORTH, RANGE 1 WEST, BOISE MERIDIAN, BOUNDARY COUNTY, IDAHO

CULVERT AREA



0 40 80 120

NOTE:

THIS SURVEY MAKES NO REPRESENTATION OF OWNERSHIP, NOR ATTEMPTS TO SHOW ALL EASEMENTS OF RECORD OR IN VIEW, NOR PHYSICAL FEATURES AND IMPROVEMENTS OF THE PROPERTY.

METHOD OF SURVEY

THIS SURVEY WAS PERFORMED USING TRIMBLE R10, GNSS RECEIVERS AND THE DATA WAS PROCESSED USING NGS OPUS AND TRIMBLE BUSINESS CENTER. CONVENTIONAL SURVEYING WAS COMPLETED BY CONVENTIONAL AND RADIAL TIE TECHNIQUES USING A NIKON TOTAL STATION. VERTICAL DATUM: NAVD 88

SURVEYOR'S CERTIFICATE:

I, TYSON L.A. GLAHE, P.L.S. 14879, STATE OF IDAHO, DO HEREBY CERTIFY THAT THIS TOPOGRAPHIC SURVEY HAS BEEN PREPARED BY ME OR UNDER MY DIRECTION AND THAT THE MAP SHOWN HEREON IS A TRUE REPRESENTATION OF A SURVEY MADE BY ME DURING MAY, 2016.

PROFESSIONAL LAND SURVEYOR LICENSED 14879 STATE OF IDAHO TYSON L. A. GLAHE FINAL

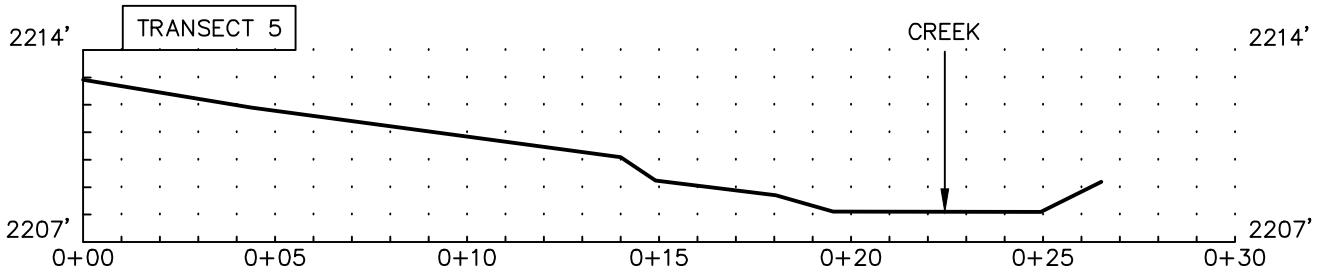
LEGEND

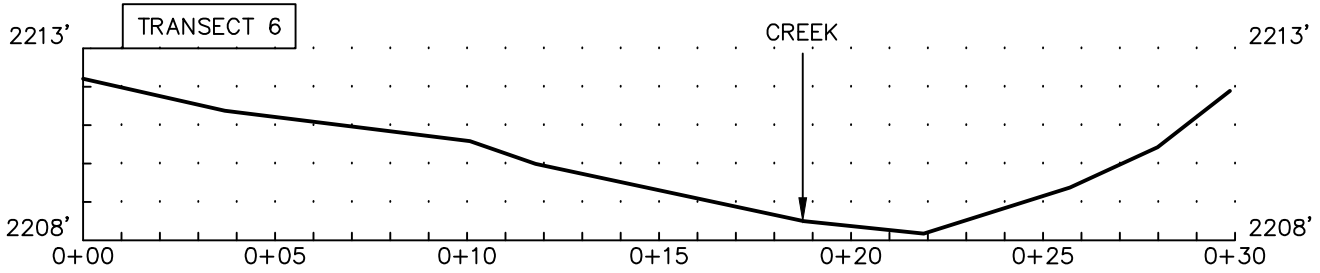
- CREEK FLOW LINE
- APRIL WETTED EDGE
- PLANTING ZONE

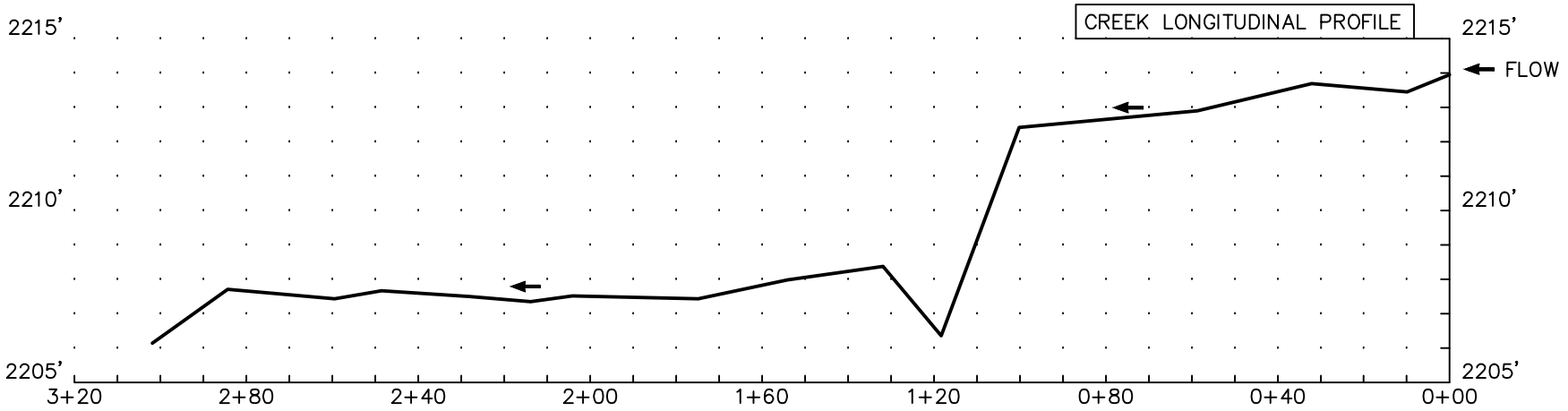
* CONTOUR ELEVATIONS SHOWN ARE 1 FT. INTERVALS

GLAHE & ASSOCIATES
PROFESSIONAL LAND SURVEYORS
P.O. Box 1863
Sandpoint, ID 83864
208-265-4474

SCALE: 1:40	
DRAWN BY: SWO	
DATE: 5/25/16	
DWG: 16-022	
SHEET 1 of 2	



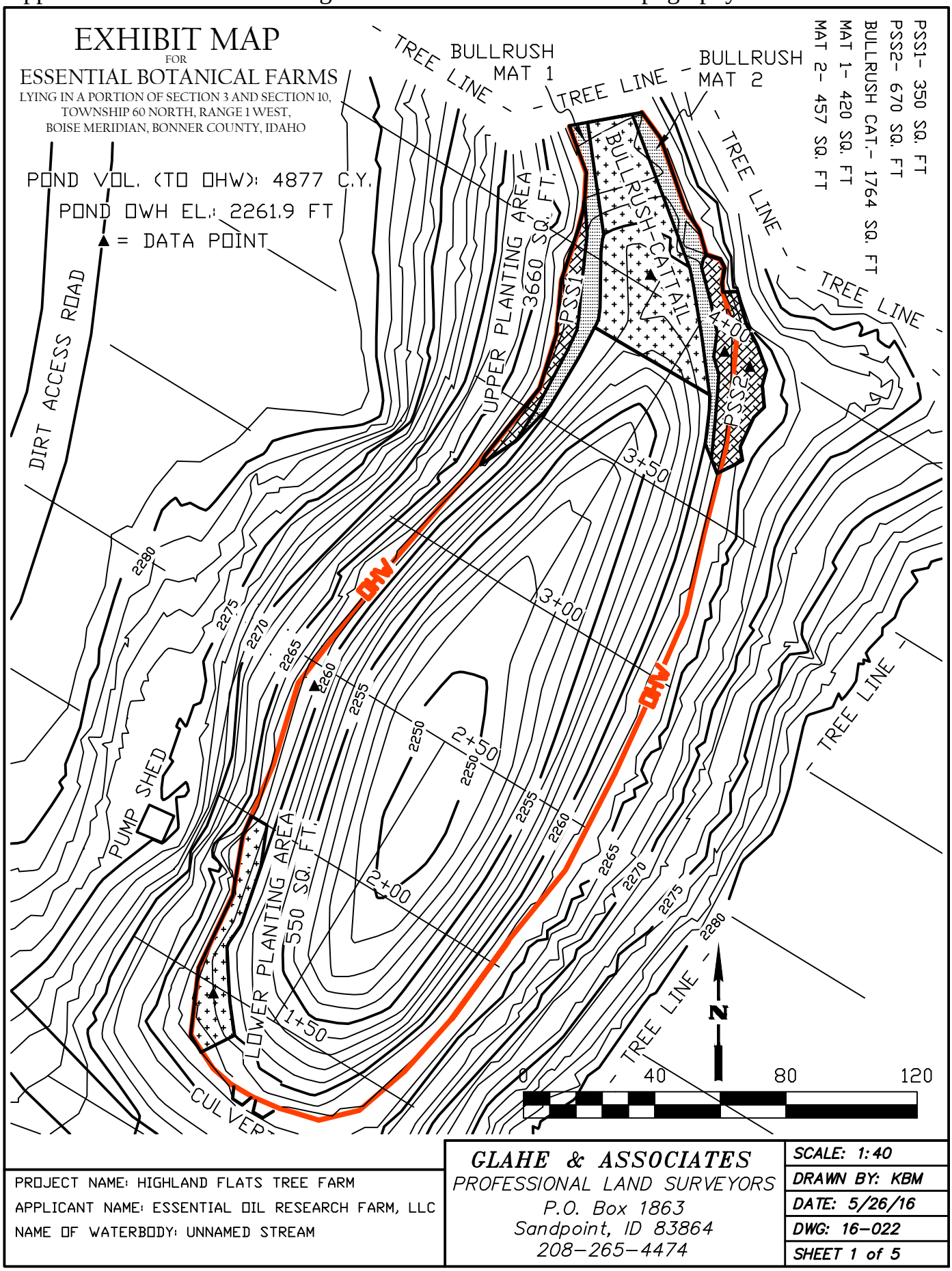




GLAHE & ASSOCIATES
PROFESSIONAL LAND SURVEYORS
P.O. Box 1863
Sandpoint, ID 83864
208-265-4474

SCALE: 1:40
DRAWN BY: SWO
DATE: 5/25/16
DWG: 16-022
SHEET 2 of 2

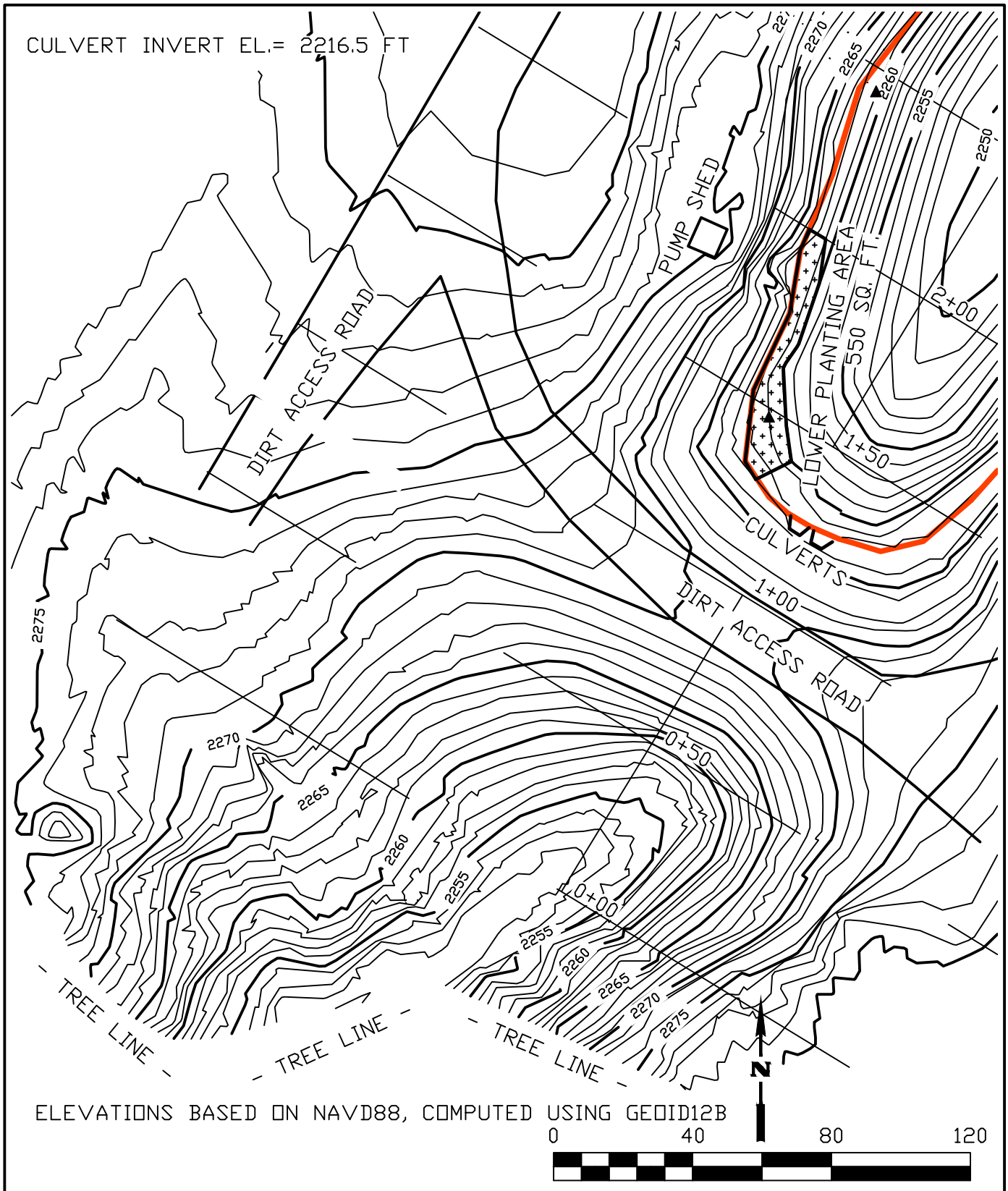
Appendix B-3. Reservoir Mitigation Area Site Details and Topography.



PROJECT NAME: HIGHLAND FLATS TREE FARM
APPLICANT NAME: ESSENTIAL OIL RESEARCH FARM, LLC
NAME OF WATERBODY: UNNAMED STREAM

GLAHE & ASSOCIATES
PROFESSIONAL LAND SURVEYORS
P.O. Box 1863
Sandpoint, ID 83864
208-265-4474

SCALE: 1:40
DRAWN BY: KBM
DATE: 5/26/16
DWG: 16-022
SHEET 1 of 5



ELEVATIONS BASED ON NAVD88, COMPUTED USING GEOID12B

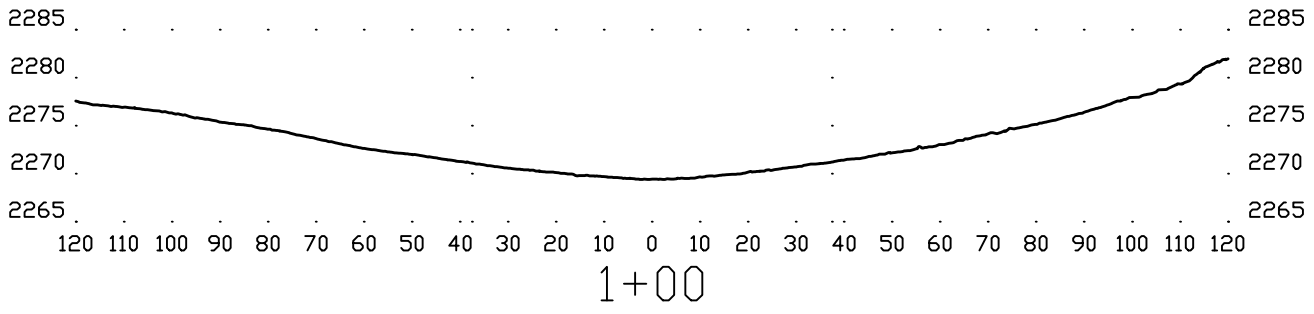
PROJECT NAME: HIGHLAND FLATS TREE FARM

APPLICANT NAME: ESSENTIAL OIL RESEARCH FARM, LLC

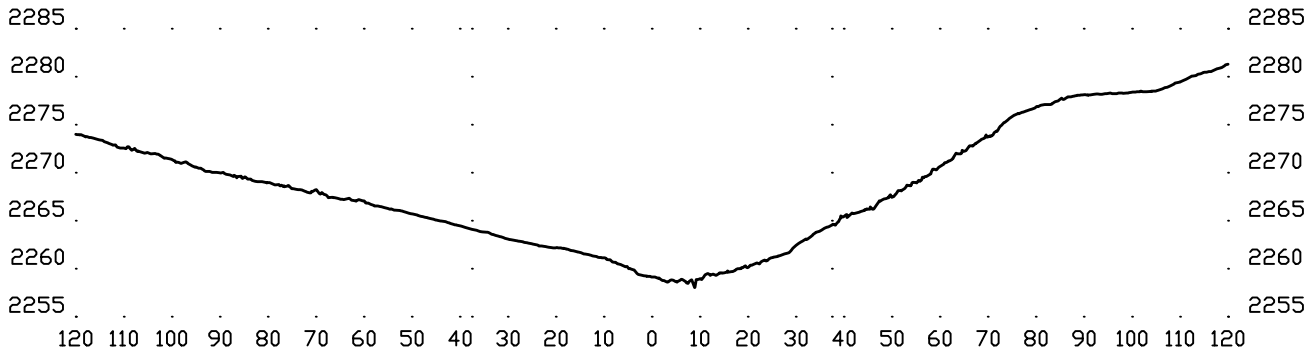
NAME OF WATERBODY: UNNAMED STREAM

GLAHE & ASSOCIATES
PROFESSIONAL LAND SURVEYORS
P.O. Box 1863
Sandpoint, ID 83864
208-265-4474

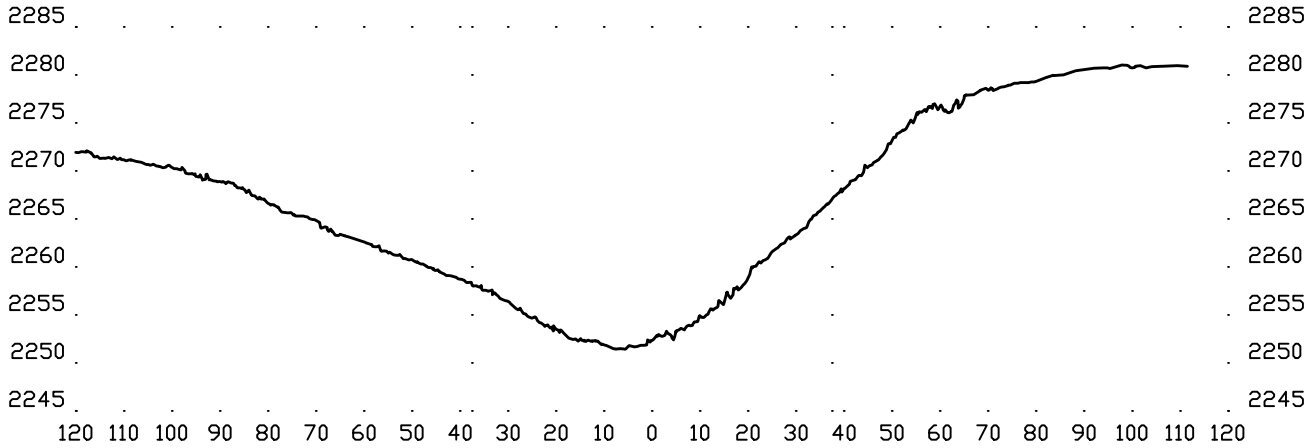
SCALE: 1:40
DRAWN BY: KBM
DATE: 5/26/16
DWG: 16-022
SHEET 2 of 5



1+00



0+50



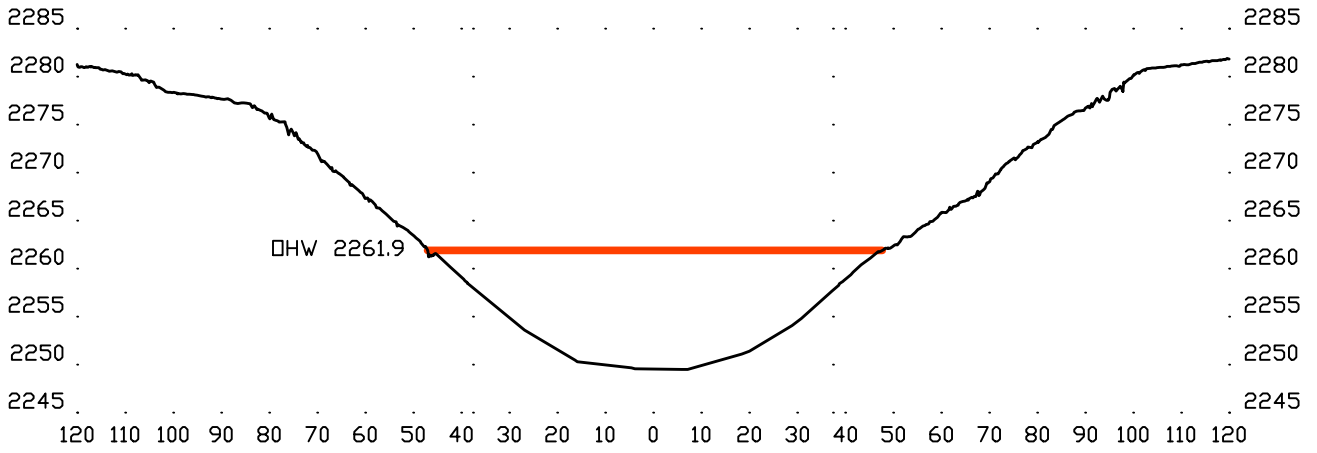
0+00

HORIZONTAL SCALE 1:40, VERTICAL SCALE 1:20

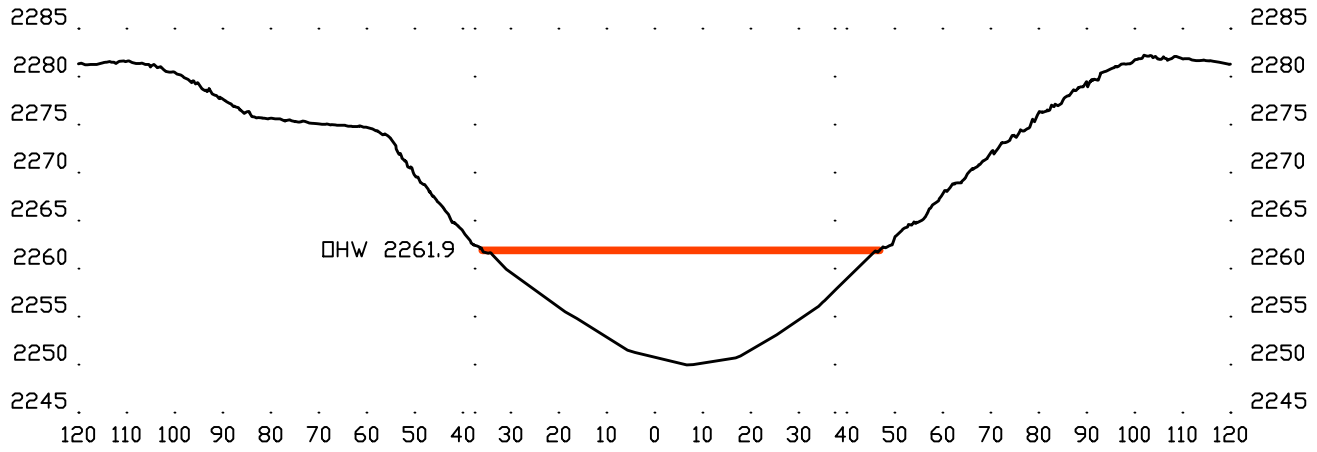
PROJECT NAME: HIGHLAND FLATS TREE FARM
APPLICANT NAME: ESSENTIAL OIL RESEARCH FARM, LLC
NAME OF WATERBODY: UNNAMED STREAM

GLAHE & ASSOCIATES
PROFESSIONAL LAND SURVEYORS
P.O. Box 1863
Sandpoint, ID 83864
208-265-4474

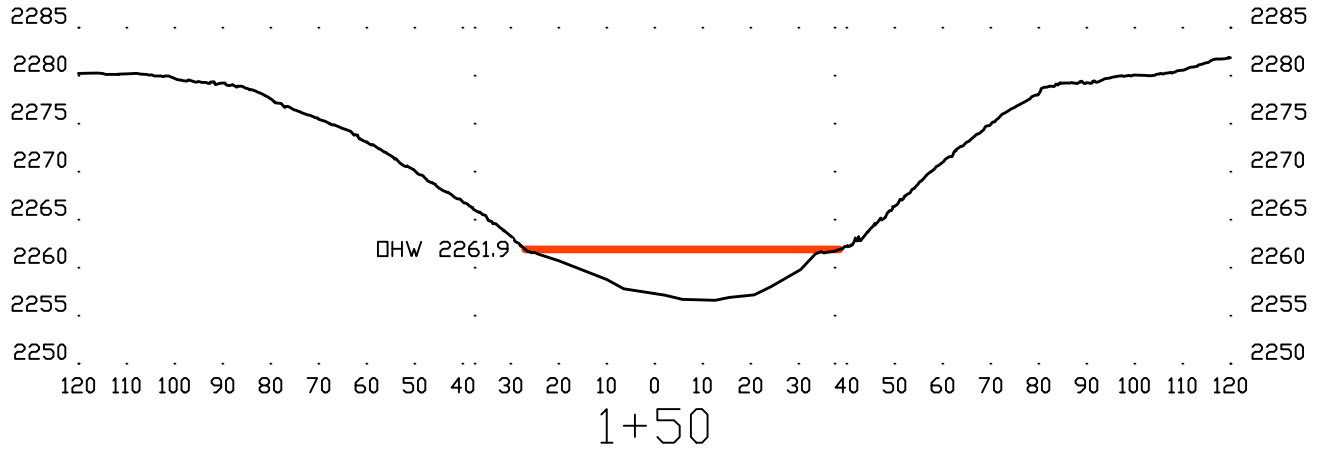
SCALE: SEE ABOVE
DRAWN BY: KBM
DATE: 5/26/16
DWG: 16-022
SHEET 3 of 5



2+50



2+00



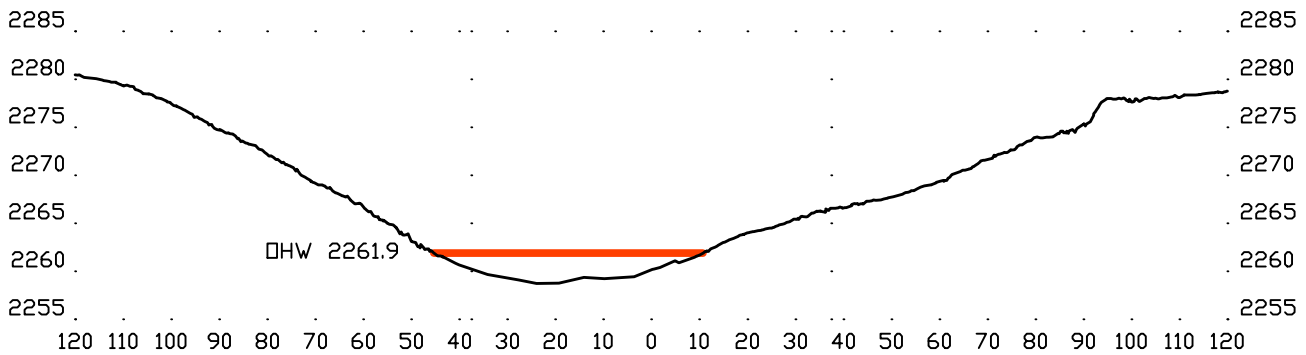
1+50

HORIZONTAL SCALE 1:40, VERTICAL SCALE 1:20

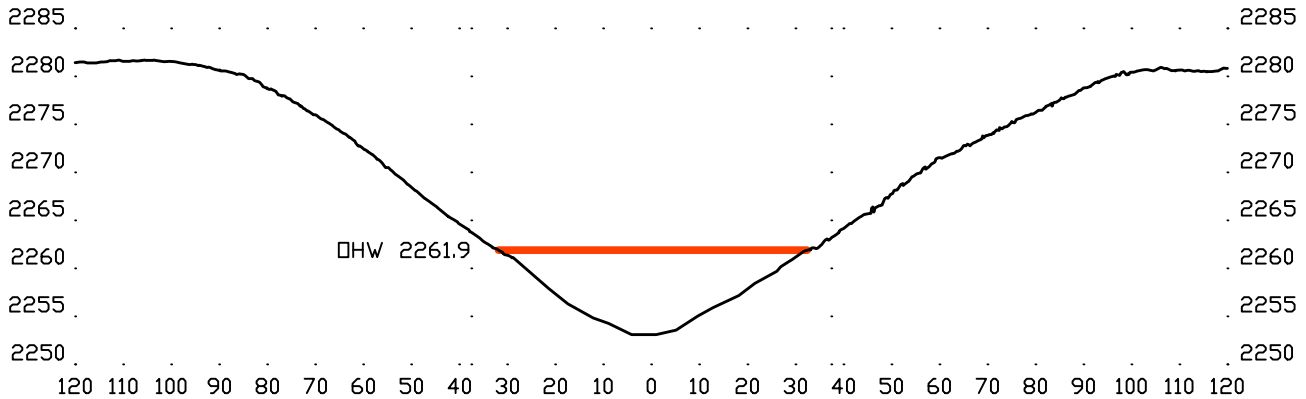
PROJECT NAME: HIGHLAND FLATS TREE FARM
APPLICANT NAME: ESSENTIAL OIL RESEARCH FARM, LLC
NAME OF WATERBODY: UNNAMED STREAM

GLAHE & ASSOCIATES
PROFESSIONAL LAND SURVEYORS
P.O. Box 1863
Sandpoint, ID 83864
208-265-4474

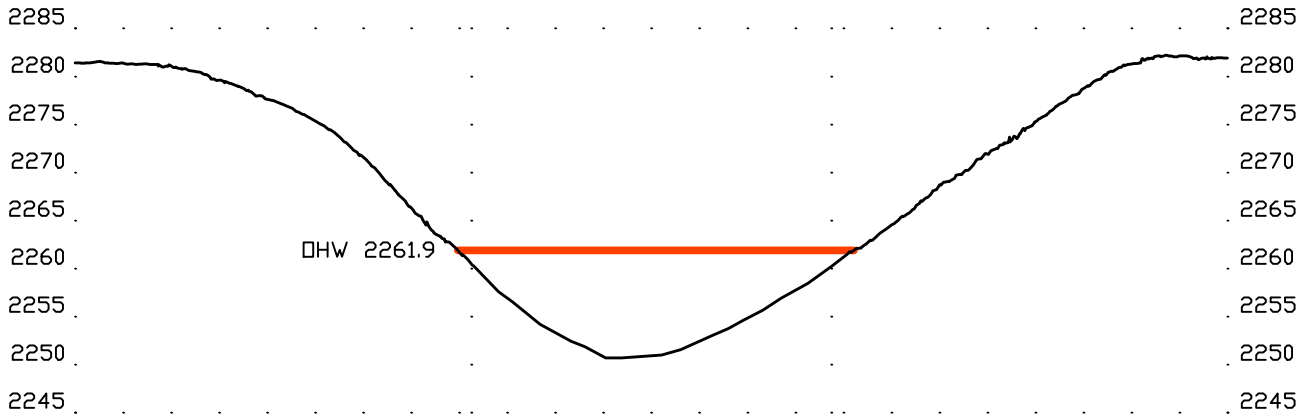
SCALE: SEE ABOVE
DRAWN BY: KBM
DATE: 5/26/16
DWG: 16-022
SHEET 4 of 5



4+00



3+50



3+00

HORIZONTAL SCALE 1:40, VERTICAL SCALE 1:20

PROJECT NAME: HIGHLAND FLATS TREE FARM
APPLICANT NAME: ESSENTIAL OIL RESEARCH FARM, LLC
NAME OF WATERBODY: UNNAMED STREAM

GLAHE & ASSOCIATES
PROFESSIONAL LAND SURVEYORS
P.O. Box 1863
Sandpoint, ID 83864
208-265-4474

SCALE: SEE ABOVE
DRAWN BY: KBM
DATE: 5/26/16
DWG: 16-022
SHEET 5 of 5

APPENDIX C-SUMMARY OF ALL WOODY SPECIES TO BE PLANTED

Species Name Legend:

Alin=Alnus incana (speckled alder)
Cose=Cornus sericea (red-osier dogwood)
Crdo=Crataegus douglasii (black hawthorne)
Pico=Pinus contorta (lodgepole pine)
Poba=Populus balsamifera (black cottonwood)
Potr=Populus tremuloides (aspen)
Sabe=Salix bebbiana (Gray willow)
Saex=Salix exigua (coyote willow)
Spdo=Spirea douglasii (Douglas's meadowsweet)
Syal=Symphoricarpos albus (snowberry)

Appendix C-1. Summary of All Woody Plant Material to Be Placed in the Highland Flat Farm Mitigation by Year and Overall*.

Mitig Area	Habitat	Bare Root Shrubs and Trees										
		Alin	Cose	Crdo	Pico	Poba	Potr	Saex	Sabe	Spdo	Syal	Total
2016												
Culvert	PFO					30				10		40
Culvert	PSS	32	42									74
Reservoir	PSS							50				50
Reservoir	PSS-Exper							50				50
HW-2	Mesic Rip									72	80	152
HW-2	PSS-partial		8					20				28
HW 3a-upper	PFO/SS					10				36		46
Total		**32**	**50**			**40**		**120**		**118**	**80**	**440**
2017												
HW-3a	PFO/SS			39		85			77	419		620
HW-all	PSS		19					20		11		50
HW-1,3a	Mesic Rip									119	229	348
HW-1	Upl Rip				13		13					26
HW-3a/b	Upl Rip			21	12		12					45
Total		**0**	**19**	**60**	**25**	**85**	**25**	**20**	**77**	**549**	**229**	**1089**
Total-Both Yrs		**32**	**69**	**60**	**25**	**125**	**25**	**140**	**77**	**667**	**309**	**1529**
* Total without experimental willows=1479												